NETWORK WORLD

The Newsweekly of User Networking Strategies

Volume 8, Number 14 | An International Data Group Publication | April 8, 1991

LAN-minded user bidding adieu to host

By Timothy O'Brien
West Coast Bureau Chief

NEW YORK — Turner Corp. last week said it is entering the final phase of an exhaustive downsizing effort and will leave its mainframe behind when it moves to a new corporate headquarters in August.

The company has worked for more than five years to migrate accounting, project management, estimating, office management and other applications from an IBM 4341 mainframe to a companywide LAN internetwork. This month, Turner enters the final stage of parallel computing operations in which mainframe and local-area network-based applications are running in tandem.

Over the years, the growing use of LANs in regional offices and on job sites has helped Turner become more competitive and efficient in managing construction projects.

Through downsizing, the company has been able to increase the functionality of applications and give end users more timely access to data than was possible in a centralized processing environment.

The downsizing effort also mirrors changes in Turner's approach to business, supporting decentralization and more auton-

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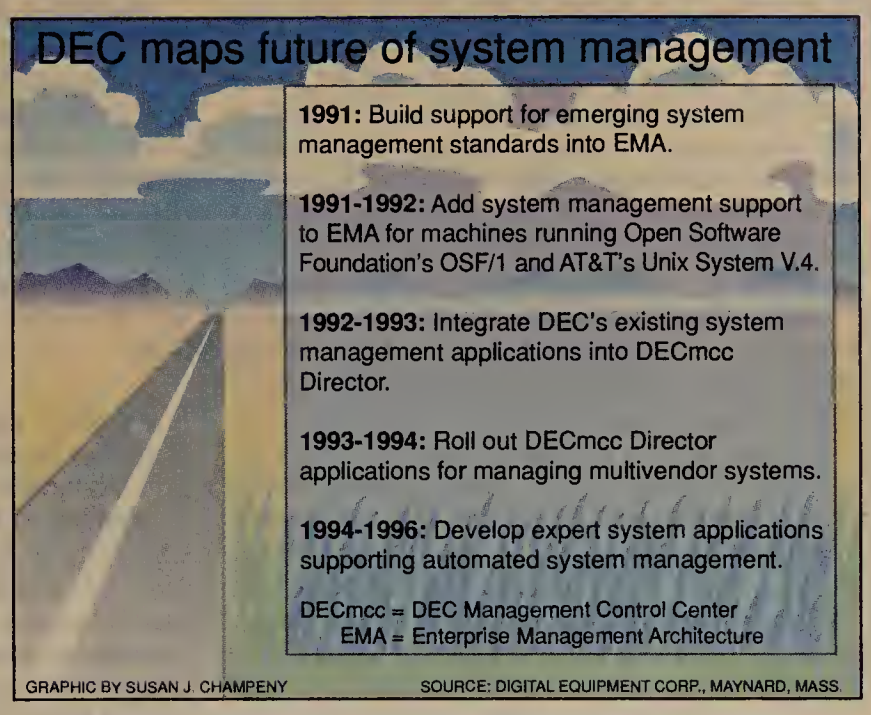

User does the 'impossible' in solving LAN bridge woes

By Caryn Gillooly
Senior Editor

MINNEAPOLIS — Washington Square Capital, Inc. (WSC) has done what some vendors said was impossible: It found a low-cost way to link two Novell, Inc. Netware LANs supporting incompatible routing protocols.

With Novell's help, the company rigged a special bridge that translates between the local-area networks. The connection provides users with much needed access to host data bases and applications on the network of WSC's parent company at a fraction of the cost of products pitched by internetworking suppliers.

WSC, an investment arm of Northwestern National Life Co. (NWNL), has a token-ring backbone connecting eight Advanced NetWare LANs.

The LANs communicate using Novell's Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX) protocol

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DEC, Novell plot new management courses

DEC to bring system management functions under EMA umbrella.

By Jim Brown
Senior Editor

MAYNARD, Mass. — As expected, Digital Equipment Corp. last week laid out a five-year plan to weave system management capabilities into its Enterprise Management Architecture (EMA).

Under its Polycenter program, DEC will fold existing system management functions into its DEC Management Control Center (DECmcc) Director, the cornerstone EMA product ("DEC to incorporate system management into its EMA," *NW,* April 1).

Adding system management capabilities to DECmcc Director will enable users to manage VAXes and other vendors' processors, applications, data bases and storage devices from a central site. Through DECmcc Director, administrators will be able to

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Novell said to be at work on systems and network control architecture.

By Caryn Gillooly
Senior Editor

SALT LAKE CITY — Novell, Inc. is expected later this month to unveil a comprehensive systems and network management architecture designed to support centralized management of NetWare local-area networks and other LANs across an enterprise.

The architecture will be embodied in Novell and third-party products, including a central-site integrated manager, that let users monitor and control physical objects such as workstations and wiring, as well as software including NetWare Loadable Modules.

According to sources, the architecture will provide links to

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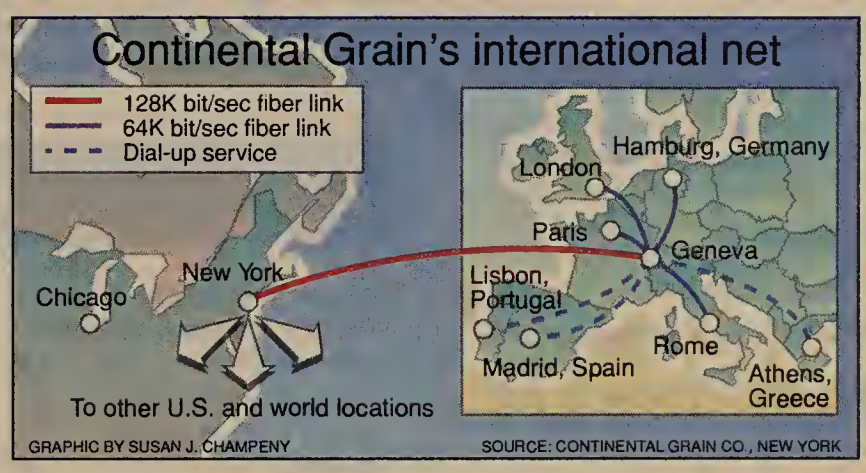

Continental Grain redraws its global network map

By Barton Crockett
Senior Editor

NEW YORK — Continental Grain Co. this month will cut over a European net that is expected to slash costs by merging compressed voice and data onto a digital backbone and improve service by tying foreign sites into a simplified corporate dialing plan.

The privately held, $13 billion commodities trading company will route voice and local-area network traffic over a 128K bit/sec fiber link from its headquarters here to a hub in Geneva. From the hub, traffic will flow over 64K bit/sec lines to Hamburg, Germany, London, Paris and, in May, to Rome (see graphic, this page).

The net will replace a mixed bag of international switched voice and public electronic mail services, as well as a U.S.-to-Geneva 64K bit/sec private line. Keith Johnson, Continental Grain's director of technology services, estimates that the company will save enough in 18 months to recoup its $600,000

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BUYER'S GUIDE

Controlling protocol confusion

By Edwin Mier
Special to Network World

Connecting and integrating different kinds of local-area networks is critical to most organizations. But it is far from an easy task, largely because of the numerous network- and transport-layer protocols involved.

Because Open Systems Interconnection is not yet here, the key to enterprisewide LAN connectivity is implementing a common transport protocol structure — one that supports the organization's various applications and data traffic and rides over an assortment of LANs and wide-area networks.

To obtain this common structure, a cornucopia of multiprotocol software is available (see chart, page 40). But while these packages provide the foundation for constructing multiprotocol net-

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NETLINE

NEWSPAPER

Feds serve up GOSIP 2.0, mandating use of ISDN, VT

Set to take effect in '92, the mandate calls for additional compliances for gov't net purchases.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — The second version of the Government Open Systems Interconnection Profile (GOSIP) was published last week as an official federal procurement mandate to take effect Oct. 3, 1992.

As a supplement to GOSIP 1.0, GOSIP 2.0 calls for network managers in the government to buy products conforming to Integrated Services Digital Network and OSI protocols for Virtual Terminal (VT) as well as the End System-to-Intermediate System (ES-IS) routing protocol.

GOSIP 1.0, which took effect last August, mandated that government agencies buying network equipment must purchase devices compliant with the following OSI specifications: File Transfer, Access and Management (FTAM), X.400 Message Handling System, X.25 and the IEEE 802.3 Ethernet, 802.4 token bus and 802.5 token-ring local-area networks.

The VT capability called for in GOSIP 2.0 will enable workstations in multivendor networks to access a range of hosts. Edwin Mier, president of Mier Communications, Inc., a consultancy in Princeton Junction, N.J., noted that Retix offers VT software for MS-DOS and Unix-based per-

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TI irons out wrinkles in its worldwide EDI system

Pilot test shows net not yet completely fail-safe.

By Maureen Molloy
Staff Writer

PLANO, Texas — While pleased with the results of its initial pilot test, Texas Instruments, Inc. says a number of bugs must be worked out before it can reap the full benefits of using an X.400 electronic mail network to support EDI transmissions.

Mark Payne, TI's worldwide electronic data interchange deployment manager, said he is optimistic about the potential of the technology, which promises users global accessibility and the ability to send business partners compound documents on a single channel. However, the pilot revealed some implementation challenges with addressing, delivery acknowledgments, links between value-added networks (VAN) and, most importantly, lack of trading partner readiness.

"The testing has shown that we can move documents inside the X.400 envelope, but we're not convinced it's a fail-safe system," Payne said. "The technology is still so new and, with so many components involved, it'll be a while before we achieve complete confidence in it."

But observers say the Consultative Committee on International Telephony and Telegraphy's ratification last month of X.435, the global standard for transfer-

(continued on page 61)

DEC to enter hub market with Ethernet concentrator

By Eric Smalley
Senior Editor

MAYNARD, Mass. — Digital Equipment Corp. is jumping into the smart hub market this week with the introduction of a low-end Ethernet concentrator that supports Ethernet bridges and terminal servers.

The eight-slot DEChub 90 is configured using port and feature modules the size of elongated videocassettes. The port modules can also be used independently of the hub if outfitted with their own power supplies.

DEC is targeting the hub at work groups and has designed the product's appearance and mountings for office settings as well as wiring closets.

The DEC smart hub will be well received by customers who are extending their DECnet networks into new work groups, according to Michael Howard, president of Infonetics Research Institute, Inc., a San Jose, Calif.-based market research firm.

The DEChub 90 is the "most compact package I've heard of for a small hub," he said. The hub measures 12 by 17½ by 6½ inches when fitted with modules.

A configuration of the hub

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Briefs

Unisys to unleash OLTP, LAN wares. Unisys Corp. this week will announce its long-awaited Unix-based distributed on-line transaction processing (OLTP) software. Open/OLTP will enable the company's U 6000 Series of processors to route transactions generated by multiple vendors' client workstations to Informix Software, Inc. data base management systems running on various vendors' servers ("Unisys showcases early release of its OLTP Unix-based software," *NW,* Jan. 28). The firm will also announce a Unix-based version of Microsoft Corp.'s LAN Manager that will enable its U 6000 Series products to act as servers for LAN-attached microcomputers.

DEC clarifies Cisco deal. Digital Equipment Corp. officials last week offered new details about a resale agreement it recently signed with Cisco Systems, Inc. Cisco products will be included in DEC's price book, a DEC spokeswoman said, meaning Cisco's multiprotocol routers join products from Chipcom Corp., StrataCom, Inc. and Vitalink Communications Corp. in DEC's product listing. Analysts said inclusion of the routers in the book raises questions about DEC's plans to build its own multiprotocol router and threatens sales of Vitalink's Internet Protocol router via DEC channels.

Markey to float Bells bill. Rep. Edward Markey (D-Mass.) will introduce a "free-the-Bells" bill in the House soon after April 8, when the congressional spring break ends, an aide to Markey said last week. The bill will propose to lift the equipment manufacturing ban on the regional Bell holding companies. In addition, it will touch on the Bell information services restriction by proposing general consumer protection safeguards if District Court Judge Harold Greene decides to lift the prohibition.

Iowa T-3 net back on track. Construction of Iowa's on-again, off-again Iowa Communications Network, a statewide T-3 net, received a green light last week when the Iowa House of Representatives refused to vote on a bill that could have derailed the network project ("Iowa T-3 net is a political hot potato," *NW,* April 1).

Because representatives passed over the bill, it is effectively dead, a government source said. A parallel bill was approved in the Iowa Senate two weeks ago amidst concerns by some legislators about the proposed network's cost and design. The net will carry video, voice and data traffic for the state's educational institutions and government agencies.

Wellfleet, Digital Link team on SMDS. Wellfleet Communications, Inc. and Digital Link Corp. last week announced that they have jointly developed an interface to allow Wellfleet routers to tie into Switched Multimegabit Data Service (SMDS) networks through Digital Link's data service unit/channel service units. The two vendors will offer their SMDS Data Exchange Interface in products during the second half of this year to enable users to link local-area networks across high-speed SMDS lines.

Insurer picks MCI for custom net. Western & Southern Life Insurance Co., a $1 billion firm based in Cincinnati, has signed a three-year multimillion-dollar agreement with MCI Communications Corp. for a custom network that includes Vnet, 800 and data services. The firm has brought two subsidiaries, Columbus Life Insurance Co. and Continental General Insurance Co., into the deal to expand its enterprisewide network. Company officials said they decided to give MCI almost all of the traffic because they were satisfied with the service and would reap significant savings. AT&T also bid on the contract.

FCC probes bandwidth issue. Speaking at the Bellcore Industry Affairs Conference here last week, Tom Stanley, Federal Communications Commission chief engineer, said the FCC will complete by year end a study to determine which microwave users could be moved to other parts of the radio spectrum in order to accommodate such new technologies as personal communications networks (PCN) and Digital Audio Broadcast (DAB). The FCC is examining which microwave services in the bands between 1,850 to 2,200 MHz could be moved elsewhere should it decide to set up a bandwidth reserve for new technologies. If the FCC decides to reallocate bandwidth for PCN and DAB services, microwave users will be forced to move, he said, adding that the FCC is fully empowered to act in the matter.

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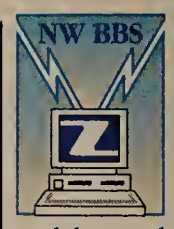

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Which V.32 Modem Is The Most Intelligent Buy? Ours Tops The Chart.

..."Digicom's 9624LE+ offers above average performance, good compatibility...plenty of optional features and even fax support.." PC WEEK

PC WEEK High-speed Modem Product Review / November 19, 1990

PC WEEK LABS — ANALYST'S SCOREBOARD

	Digicom Systems Inc. 9624LE+	Hayes Microcomputer Products, Inc. Hayes Ultra 96	Microcom Inc. QX/4232hs	Multi-Tech Systems Inc. MultiModem V32	Universal Data Systems, Inc. FasTalk V.32/42b	U.S. Robotics Inc. Courier V.32
1. Price / Performance	●	◒	◒	◒	◒	◒
2. Support of Older Modems	●	●	●	●	●	●
3. V.32 / V.42bis Compatibility	●	●	◒	◔	◔	●
4. Overall Performance	●	●	●	●	●	●
5. Quality of Workmanship	●	◒	◒	◒	◒	◒

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Users criticize LECs' first rate reductions under price cap plan

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — In their first price cap tariff filings last week, the regional Bell holding companies and five independent local carriers proposed lowering interstate access charges by a total of about $177 million on July 1 — reductions that users and long-haul carriers criticized as too small.

The reductions varied by carrier, but on average, local telephone companies each proposed to reduce prices by 0.93%. Prices affected by the reductions include those for interstate switched and special access services, carrier and residential line charges, and operator services. Despite the overall reductions proposed, many of the carriers are actually seeking rate hikes for special access, which is the access purchased for leased lines.

Long-distance carriers, the primary buyers of access services, said the reductions were too small. Access charges make up about 50% of the price of a long-distance call, and some portion of access charge reductions is generally passed on to users by long-distance carriers.

James Blaszak, counsel for the Ad Hoc Telecommunications Users Committee, which has opposed the price cap plan, said that since divestiture when access charges were created, local carriers have generally lowered their rates between 3% and 4% in their annual tariff filings. Thus, the proposed reductions under price caps fall short of the cuts that would have been expected under rate-of-return regulation.

Brian Moir, counsel for the International Communications Association, agreed that the reductions fell short. During the last three years of rate-of-return regulation, the local carriers requested between $400 million and $500 million each year in access charge reductions, he said. In two of those years, the FCC raised the access charge cuts to more than $1 billion.

"This number of $177 million is pitiful," Moir said. "It clearly demonstrates that if this [requested reduction] is allowed to take effect, the commission's price cap plan is flawed."

Last year, the Federal Communications Commission mandated price cap regulation for the RBHCs and General Telephone Operations. Four other local carriers — Contel Corp., Rochester Telephone Corp., Southern New England Telephone Co. and United Telephone Systems, Inc. — vol-

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Vendors join to build standard RISC architecture

By Bob Brown
and Eric Smalley
Network World Staff

NEW YORK — A coalition of hardware and software vendors is expected to outline here tomorrow its plan for developing a standard Reduced Instruction Set Computer (RISC)-based workstation architecture.

The coalition is led by Compaq Computer Corp., Digital Equipment Corp., Microsoft Corp., MIPS Computer Systems, Inc. and The Santa Cruz Operation, Inc. (SCO). Depending on user reaction, products based on the proposed architecture could challenge offerings from workstation market leader Sun Microsystems, Inc. and others.

As many as 35 other vendors, including local-area network specialist Banyan Systems, Inc., are expected to endorse the

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NW/Bell Labs to test SNMP

Don't miss our April 22 issue, which will feature the results of the first Simple Network Management Protocol (SNMP) interoperability tests in the *Network World*/AT&T Bell Laboratories SNMP Test Series.

In this effort, AT&T Bell Labs and *Network World* put the SNMP management capabilities of local-area network bridges to the test in a real-world network environment. SNMP is an emerging standard for multivendor network management, and dozens of vendors have announced SNMP-compliant products in recent months.

Testing was conducted jointly by representatives of AT&T Bell Labs and *Network World* at AT&T Bell Labs facilities in New Jersey.

Products tested included bridges from Advanced Computer Communications, Alantec, Hughes LAN Systems, Racal InterLan, Inc., Retix, 3Com Corp. and Xyplex, Inc.

Du Pont to insist vendors support ODA specification

Will eliminate need for gateways, translators.

By Bob Brown
Senior Editor

WILMINGTON, Del. — E.I. du Pont de Nemours & Co. last week said it will soon require vendors of electronic mail, imaging and other products to support the Open Systems Interconnection Open Document Architecture (ODA) standard.

ODA describes how compound documents comprising text, graphics and other components are structured for exchange between multivendor systems. By replacing proprietary technologies and translation devices with ODA-based products, du Pont will be able to exchange documents across disparate systems more quickly and less expensively.

Du Pont's public vote of confidence for ODA followed the announcement last week in Brussels, Belgium, that six systems vendors had joined forces to promote the development of products incorporating ODA ("Vendors rallying to push open document standard," *NW,* April 1).

The ODA Consortium members are Digital Equipment Corp., Groupe Bull SA, IBM, ICL, Siemens Nixdorf Informationssysteme AG and Unisys Corp., which this week will unveil plans for its first product supporting ODA. The consortium will design a tool kit that developers can use to build applications supporting ODA.

Raymond Cairns Jr., senior vice-president of du Pont's Information Systems group, praised the formation of the ODA Consortium as a means for pushing ODA-based products to market.

"When the consortium delivers the ODA tool kit and it is [used to build] products we can buy, du Pont will be able to move documents anywhere in the world — to all du Pont locations and to our customers, vendors and government agencies," Cairns said.

The tool kit is expected to be ready in 1993, according to a statement from DEC, which has been selected to provide technology for the kit based on its proprietary Compound Document Architecture.

But David Shorter, chairman of the ODA Consortium, said he expects parts of the tool kit to be made available well before that. He said no specific timetable has been set for those portions.

ODA will become a du Pont Corporate Information Systems Standard alongside X.400 and other OSI standards, said Warren Hoffman, principal consultant for du Pont's Information Systems group.

Using ODA-compatible products will be a big improvement over the existing proprietary systems and translators that du Pont is forced to use in document ex-

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Intergraph offers PC CAD users NetWare, DB2 link

By Caryn Gillooly
Senior Editor

HUNTSVILLE, Ala. — Intergraph Corp. last week announced a version of Novell, Inc.'s Portable NetWare that will enable users to position the company's Unix processors as CAD/CAM file and print servers for personal computers on a NetWare LAN.

Intergraph also announced an enhancement to its existing Relational Interface System (RIS) that allows Intergraph workstation users to access data on hosts running IBM's DB2 relational data base management system.

Intergraph NetWare will prove especially beneficial to users that already own NetWare local-area networks but do not want to add support for Transmission Control Protocol/Internet Protocol to establish links with Intergraph's InterPro workstations or InterServe servers.

In addition, Intergraph NetWare will enable a user to position Intergraph devices as servers for users of Autodesk, Inc.'s AutoCAD, Intergraph's MicroStation PC or other popular personal computer-based computer-aided design and manufacturing applications, the company said.

Intergraph NetWare is software that resides on the company's Unix-based InterPro workstations or InterServe servers on a NetWare LAN and enables any client workstation to access files or run NetWare applications residing on the server.

"Anybody can use the Intergraph system as a file server," said John Allen, a senior systems consultant with Intergraph. "It gives an AutoCAD user, for example, the ability to store files on our servers. Later, the AutoCAD user may want to exchange data with our workstations."

An Intergraph NetWare server would handle the conversion by taking an AutoCAD file and running it through a graphics translator to route it to an Intergraph workstation running MicroStation, the company's three-dimensional design software.

Until now, MicroStation users on NetWare LANs had to add TCP/IP support to communicate with the Intergraph servers on a separate TCP/IP net. With Intergraph NetWare, users continue to support Novell's Integrated Packet Exchange/Sequenced Packet Exchange (IPX/SPX) protocol suite and access an Intergraph server as if it were any other NetWare server on the LAN, Allen said.

Charles Foundyller, president

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User bids adieu to host

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omy for remote offices.

"Virtually everything is off the mainframe. This represents the culmination of years of work in which we've seen tremendous benefits," said John Good, manager of distributed systems at Turner.

Turner, headquartered here, has approximately 30 offices and project sites around the country. Prior to implementing LANs, these facilities housed IBM Series/1 minicomputers that supported terminal access to the host via leased lines.

Beginning in 1985, interest began to grow in installing LANs to link the personal computers cropping up in regional offices. End users were realizing many benefits from off-the-shelf personal computer-based applications, instead of more cumbersome mainframe tools. They wanted to maximize the potential of the desktop devices and improve productivity further through LANs.

After experimenting with a prototype LAN installation for a year, management approved Banyan Systems, Inc.'s VINES as the company standard. Then with the steady growth and acceptance of the personal computers and LANs, applications began to be moved off the mainframe.

Three years ago, Turner equipped the LANs with high-speed dial-up modems for access to the host and eliminated the Series/1 minicomputers and the leased lines — a move that yielded significant savings. In addition, the growing use of LAN-based applications has helped Turner avoid the cost of upgrading the mainframe. Today, Turner has approximately 1,500 personal computers on 40 interconnected Ethernet LANs equipped with file servers running VINES.

"Users on the network are far more productive than they ever could have been staying with the mainframe," Good said.

The company evaluated each host application to determine how best to implement it in the LAN environment. In some cases, off-the-shelf packages replaced mainframe systems, but many programs were unique to Turner's operations and had to be rewritten for the LAN environment. Most of the downsized programs were developed using Revelation Technologies, Inc.'s Revelation system.

One new human resources application has been developed using GUPTA Technologies, Inc.'s SQLBase data base server and features a Microsoft Corp. Windows workstation front end.

> "Users on the net are more productive than they could have been with the mainframe."
>
> ▲▲▲

Good said particular attention was paid in the development process to issues such as the user interface, the flexibility of program options and the reliability of the new systems.

One problem with switching to a distributed system is the need for more technical expertise in remote offices in order to handle complex LANs and applications. Finding professionals and training them was a slow process.

Another problem has been the lack of tools for managing a distributed processing environment — a problem that slowed the downsizing effort. "We've pushed hard. We had to wait for technology to catch up for us to continue," Good said.

For companies just starting on the road to downsizing, Good said he believes it will be much easier now than it was for Turner. Every year, new tools are introduced that make the job of downsizing easier and less time consuming.

Good believes management should examine the way the business is run and clearly understand how downsizing will affect operations.

Omission: The following product was mistakenly omitted from *Network World's* Buyer's Guide on intelligent wiring hubs, which appeared in our March 11 issue.

NETWORK WORLD

Intelligent wiring hubs

Company	Product	Network link pair cabling/ node port cabling	LANs supported	Management capabilities	Management protocols	Remote diagnostics/ reporting	Third-party management software interfaces	Types of networks that can be bridged	Maximum number of nodes/networks	Power supply	List price
AT&T Computer Systems Morristown, N.J. (800) 247-1212	StarLAN 10 Network SmartHUB, StarLAN 10 Network SmartHUB Manager	UTP, coaxial/UTP, coaxial	802.3 over UTP	Traffic monitoring, fault management, alarms, network routing and configuration, some management features are user-programmable	SNMP	Two self-test diagnostics and 2 reset functions, via both inband and out-of-band signaling via RS-232 port	StarLAN 10 Network SmartHUB Manager and any generic SNMP manager	Not applicable	1,024/13 ports per hub	Internal	SmartHUB: $2,600; SmartHUB Manager: $1,295

SNMP = Simple Network Management Protocol
UTP = Unshielded twisted pair

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1975 *Launched the first U.S. public data network.* 1979 *Built the first commercial private packet network.* 1980 *Created the first hybrid network using private and public capabilities.*

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INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

Intelligent hub maker Chipcom Corp. revealed that sales through Digital Equipment Corp. accounted for nearly 30% of its 1990 revenue. In 1989, slightly more than 19% of Chipcom's sales were generated through DEC.

People & Positions

Francis Dramis Jr., formerly managing director of Salomon Brothers, Inc. and president of Salomon Technology Services, Inc., last week was named president and chief executive officer of **Network Management, Inc.**

Dramis, who was appointed by Howard Frank, chairman of the board at the Fairfax, Va.-based systems integrator, will assume responsibility for managing Network Management's business operations in the U.S. and Western Europe.

Wellfleet Communications, Inc. recently announced the appointment of **Stephen Cheheyl** as senior vice-president of finance and administration and chief executive officer.

Immediately prior to joining Wellfleet, Cheheyl worked as an independent consultant. In addition, he has held executive finance and administrative positions at Alliant Computer Systems Corp. and Applicon, Inc.

Professional services firm **Ernst & Young** last week announced that **David Shpilberg** has joined the consultancy to fill the position of head of the company's information technology consulting practice for financial services.

Shpilberg, who will be based in New York, has also

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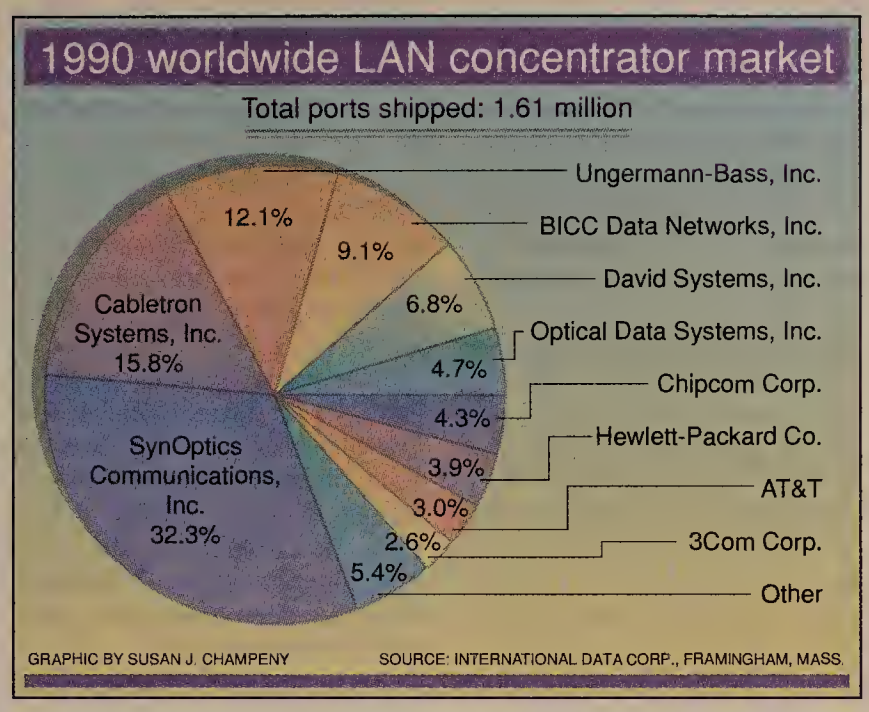

Western Digital plans to sell LAN business to SMC

SMC to get token-ring adapter card technology.

By Maureen Molloy
Staff Writer

HAUPPAUGE, N.Y. — Standard Microsystems Corp. (SMC) recently said it has agreed to acquire Western Digital Corp.'s local-area network business for $33 million.

Under the agreement, SMC will acquire Western Digital's Ethernet adapter board business as well as technology to be used in Western Digital's planned token-ring adapter card products. It will also acquire all technological properties directly related to the company's LAN business.

In addition, Western Digital will manufacture LAN boards for SMC for about one year until SMC establishes additional manufacturing capability to handle volume board production.

Also as part of the agreement, Western Digital and SMC will work together to develop the next-generation Large-Scale Integration (LSI) chip for use in LAN adapter boards, with each company retaining the right to sell the product in certain markets.

The agreement is subject to approval from each company's board of directors, as well as SMC's ability to secure financing.

Victor Trizzino, SMC president and chief executive officer, said he believes the acquisition would bolster his company's line of LAN offerings.

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Johnson said the deal will enable Western Digital to focus on manufacturing of semiconductors for OEM customers.

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Victor Trizzino, SMC president and CEO, said he believes the acquisition would bolster his company's line of LAN offerings.

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bolster his company's line of LAN offerings.

The company, a leading maker of Arcnet products, entered the Ethernet adapter card market last year.

"It will promote our strategy of being a full-line LAN supplier and accelerate our entry into the token-ring LAN market," Trizzino said.

Roger Johnson, chairman and CEO of Western Digital, said the deal will enable his company to focus on manufacturing semiconductors and disk drives for OEM customers, which accounts for 90% of the company's $1.2 billion annual revenue.

"This is an opportunity to obtain immediate value for our LAN board business while retaining key LSI technology for integration into chip applications for our OEM market," he said.

According to Frank Dzubeck,

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IDCMA reverses its Tariff 12 opposition

Group proposes FCC establishes rules allowing smaller manufacturers to offer Tariff 12 deals.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The coalition aligned against AT&T's Tariff 12 began to splinter recently when the Independent Data Communications Manufacturers Association, Inc. (IDCMA) withdrew its opposition, saying custom network deals have become a marketplace reality.

IDCMA, a strong opponent of Tariff 12 in the past, began to soften its stance earlier this month in its comments filed with the Federal Communications Commission. In reply comments filed last week, IDCMA clearly reversed its previous position — a move that was applauded by users.

The group said it no longer opposes Tariff 12 but urged the FCC to establish new rules to ensure that independent equipment manufacturers and system integrators have an opportunity to compete in putting together Tariff 12 network deals.

"Because customer-to-carrier negotiations leading to single-customer pricing have become a reality in the custom services market . . . IDCMA must accept that reality," the group stated in its filing.

Ironically, IDCMA was one of the four parties that appealed the FCC's Tariff 12 decision, a move that eventually forced the agency to open a new investigation into the legality of the deals. A federal appeals court last year ruled that the FCC improperly relied on price differences as the distinguishing factor between Tariff 12 packages and their underlying component services, and ordered the FCC to reconsider the matter.

Neither US Sprint Communications Co. nor MCI Communications Corp., two of the most vocal opponents of Tariff 12, would comment on IDCMA's reversal. However, several telecommunications attorneys predicted that IDCMA's change of heart would have little dampening effect on opponents' efforts to defeat Tariff 12. They said IDCMA has a different perspective on the Tariff 12 debate than did rival service providers.

IDCMA said it will focus its efforts on the establishment of

(continued on page 10)

INDUSTRY BRIEFS

Timeplex licenses Make Systems software. Timeplex, Inc. last week said it will license, market and support a version of Make Systems, Inc.'s Netool decision support software. The software models the operating characteristics of the Timeplex Link+ multiplexer, thus enabling users to analyze existing network operations and configurations, as well as plan and test changes to the network.

Timeplex, located in Woodcliff Lake, N.J., and Make Systems, based in Mountain View, Calif., have been working together to develop an upgraded version of Make Systems' Netool offering that would enable users of Timeplex's Time/View 2000 Network Management System to feed network information to the Make Systems decision support system. Timeplex will continue to provide Make Systems with technical information for use in developing future product-specific applications.

FCC seeks to fine GTE's Contel business. The Federal Communications Commission last week proposed fining GTE Corp.'s Contel unit $50,000 upon finding that Contel's purchasing unit allegedly overcharged its regulated phone units.

The charges are similar to those made by the FCC against Nynex Corp. last year. Those charges ended in a settlement under which Nynex's phone companies paid $1.4 million. The FCC charged that Contel phone customers were overcharged $262,400 in 1988 as a result of overcharging by the purchasing unit.

The FCC said Contel cooperated with the probe, and has

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IDCMA reverses its opposition

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rules to ensure that outside vendors have the opportunity to develop custom networks for customers and to provide equipment to customers going through AT&T for network design.

First, the group is asking the FCC to require AT&T to inform customers in writing that Tariff 12 offers cannot be conditioned in any way on the purchase of AT&T equipment.

In addition, IDCMA wants AT&T to establish a vendor liaison group to work with systems integrators in putting together Tariff 12 packages. Third parties would work with customers to design a network, including equipment, and then negotiate with AT&T for a package of transmission services.

IDCMA said its proposal will benefit users by cutting the time and cost of designing a custom network, an activity that AT&T officials estimate has cost some Tariff 12 users more than $1 million each.

"IDCMA's proposal would help to reduce transaction costs by allowing users to shop among independent vendors," IDCMA said.

Allowing third-party vendors to negotiate Tariff 12 deals will also prevent discrimination against some users that might be refused custom networks from AT&T — such as a company competing against AT&T in the credit card arena.

IDCMA has vigorously opposed Tariff 12 in the past on the grounds that the network packages are nothing more than illegal bulk discounts available only to selected customers. The group has complained that because AT&T puts together Tariff 12 deals behind closed doors, equipment manufacturers and systems integrators are prevented from competing.

IDCMA's central complaint about Tariff 12 now is that AT&T appears to be relying on nontariffed items, such as network design, network management and collocation of equipment in AT&T's central office, to distinguish Tariff 12 from components purchased separately.

User groups applauded IDCMA's turnaround. "Alone among the former opponents of [Tariff 12], IDCMA has come to grips with the fact that [Tariff 12] is a creature of the marketplace," stated the Ad Hoc Telecommunications Users Committee in a joint filing with four other customers: Asea Brown Boveri, Inc., Delta Air Lines, Inc., General Dynamics Corp. and United Technologies Corp.

> IDCMA said its proposal will benefit users by cutting the time and cost of designing a custom net.
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"[IDCMA] implicitly recognizes the futility of arguing that the commission does not have the power to permit [Tariff 12] to go forward," the user committee said. It added that IDCMA's proposed rule changes could be constructive as long as they do not delay the speedy resolution of the FCC's Tariff 12 investigation.

A second group, 33 users filing as the Custom Network Services Users Group (CNSUG), said it would support IDCMA's proposals as long as they do not hold up the FCC's proceeding. The group added that typical Tariff 12 users are large sophisticated customers that probably do not require a systems integrator, but third-party firms might be of assistance to some.

"Independent CPE vendors can play a meaningful role in bringing alternative approaches to the attention of an end user," the CNSUG said. "[IDCMA's] proposal may be helpful in those admittedly rare cases in which a customer does not wish to deal with AT&T directly."

The American Petroleum Institute (API), a group of more than 200 firms in the oil and gas industry, did not address IDCMA's proposals, but Douglas Jarrett, counsel for API, said he was happy that IDCMA had reversed its opposition.

"I think it's a positive sign that they withdrew [their opposition] because it eliminates another straw issue [from the Tariff 12 debate]," he said.

People & Positions

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been named a partner in the consultancy.

Prior to joining Ernst & Young, Shpilberg was vice-president of information technology at Goldman, Sachs & Co., where he was in charge of systems for the Equities and Asset Management Divisions worldwide.

RAD Network Devices, Inc., based in Huntington Beach, Calif., last week announced the appointment of **Thomas Martin** as president of the data communications equipment manufacturer.

Martin, who was formerly chief executive officer of ARC Electronic Associates, takes over responsibility for RAD Network Devices' sales and technical support teams.

In addition, he is responsible for the West Coast operations of the RAD Group, headquartered in Tel Aviv, Israel.

Martin succeeds interim President Michael Grimshaw. Grimshaw has been appointed to the position of director of sales responsible for U.S. bridge/router market.

Industry Briefs

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given customers refunds and adjusted its books to resolve the matter. GTE said it will pay the fine to end the matter.

MCI promotes E-mail. MCI Communications Corp. has announced a new program designed to help MCI Mail customers create an electronic mail network among their business associates.

The MCI Mail Trading Partner Program offers MCI Mail customers assistance in encouraging trading partners to use E-mail for business transactions and communications.

Under the program, MCI will help users identify potential trading partner markets, offer creative and production assistance on materials used to contact these business associates, and provide support and guidance to both the new trading partners and the customer in promoting their network inside and outside their companies.

Sea-Land Service, Inc., of Edison, N.J., is among the first users to announce it will participate in the program.

"Companies that use electronic mail for their internal communications now see the strategic benefit of using it to communicate with their business associates and trading partners worldwide," said Seth Blumenthal, president of MCI International.

EDS acquires firm. Electronic Data Systems Corp. (EDS) recently acquired most of the assets of Operator Assistance Network, a Van Nuys, Calif., provider of billing and collection services for the telephone industry. Terms of the agreement were not disclosed.

In addition to offering billing and collection services, Operator Assistance Network, a subsidiary of diversified telecommunications company Com Systems of Westlake Village, Calif., also offers specialized data processing and receivables financing to interexchange carriers, operator service providers, information service providers and pay phone owners.

The company has about 200 customers and annually conducts about $250 million in billing and collection transactions.

Officials at EDS, which has been on an aggressive campaign to increase its vertical industry expertise, said the acquisition will bolster the systems integration firm's expertise in the telecommunications industry.

AT&T teams up. AT&T and Compression Labs, Inc., a San Jose, Calif., maker of videoconferencing equipment, recently agreed to jointly develop video telephone products.

The purpose of the agreement is to use the very large-scale integration implementation of Compression Labs' compressed digital video technology and AT&T's telecommunications expertise to develop video phones for the business and residential markets.

Further terms of the agreement were not released.

Computerland buys. Computerland Corp. last week announced its intent to buy Nynex Corp.'s Nynex Business Centers for cash and Computerland preferred stock. Terms of the agreement, which is expected to be completed by June 1, were not disclosed.

The acquisition will bring together Computerland's and Nynex Business Centers' operations in the sale, service and support of microcomputers and related network products. Computerland has about 400 company-owned and franchised locations in the U.S., while Nynex Business Centers has 77 locations.

Aside from its profitable fourth quarter last year, Nynex Business Centers has brought Nynex nothing but losses since the carrier bought the business in 1986 from IBM.

Computerland said it hopes the acquisition will bring it savings derived from improved economies of scale.

Slower sales loom. Network General Corp. recently estimated that its revenue for the fourth quarter of fiscal 1991, ended March 31, will be down 2% to 4% from the previous quarter, when the company garnered $12.1 million in revenue. The company plans to announce its financials during the week of April 22.

Network General, based in Menlo Park, Calif., makes the Sniffer line of network analyzers.

According to Harry Saal, Network General's president, the slow U.S. economy is contributing to a decrease in sales to both commercial and government customers in the U.S. International sales, however, remain solid, he said.

Western Digital to sell business

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president of the Washington, D.C. consultancy Communications Network Architects, Inc., the proposed agreement is an equitable business arrangement for both companies.

SMC will obtain a greater share of the LAN market, while Western Digital unloads the smallest revenue generator in its operations to concentrate on core business units.

He said the arrangement "is a financial bridging mechanism" that will ease SMC's entrance into the Ethernet and token-ring market, and provide immediate cash for Western Digital.

Dzubeck added that the move is indicative of the growing competitiveness of the LAN adapter board market.

"It's a recognition of the 'commoditization' of these products and their narrowing profit margins," he said. "Western Digital got into the [Ethernet] board business when profit margins were much higher. Now that the margins are decreasing, they're getting out of something that wasn't their primary business."

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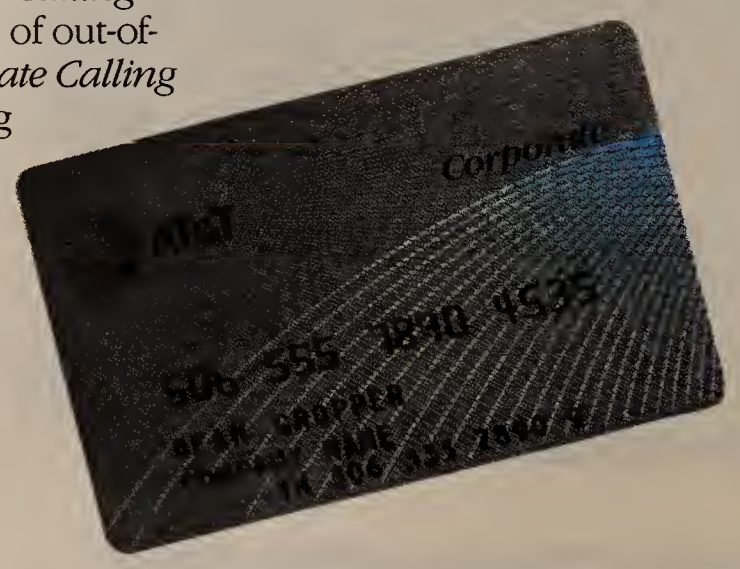

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Worth Noting

BellSouth Corp. claimed it became the nation's largest local exchange company in 1990 in terms of access lines. It has 17.5 million lines installed in its nine-state region.

Carrier Watch

TNT North America, Inc. last week awarded **MCI Communications Corp.** a three-year, multimillion-dollar network services contract that makes MCI the firm's primary carrier.

Under the agreement, MCI will build the transportation firm a Vnet virtual net service to link its Rosemont, Ill., headquarters with more than 300 sites in North America.

TNT will use MCI's Vnet International to communicate with its Sydney, Australia, parent company, TNT, Ltd.

In addition, the service will be used by TNT Express Worldwide, a global record carrier with more than 3,000 terminals, depots and offices in 184 countries.

TNT will also use MCI data, 800 and MCI calling card services.

Sprint Gateways, a unit of **US Sprint Communications Co.,** last week introduced a new 900/800 service designed to satisfy demand for media-stimulated mass calling events.

The service, which has been dubbed Mass Event 900/800, is targeted at sweepstakes, polling/sales lead generation, fund-raising and other applications requiring high-call volume handling.

The Sprint Gateways service, with 10,000 ports available, can handle both one-way passive and two-way interactive applications, according to a US Sprint spokesman. The company will offer Mass Event 900/800 service to large users as well as to existing service bureau customers for resale.

Telecom to play vital part in U.S. role in world mart

Study says technology is key to future success.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Telecommunications is one of the key technologies to the future competitiveness of U.S. corporations in world markets, but if steps aren't taken soon, U.S. firms could fall behind, according to a report released recently by the Council on Competitiveness.

The study, "Gaining New Ground: Technology Priorities for America's Future," examined nine technology sectors that are expected to fuel future industrial growth for the U.S., one of which was telecommunications. It documents the current and anticipated erosion of the U.S. position in these worldwide technology markets and suggests ways to stem the slide.

In all of the categories, the council concludes, there is a failure of U.S. corporations to turn generic technologies into marketable products. The report says there needs to be greater cooperation among government, corporations and universities in order to reverse this trend.

Also, in the case of telecommunications, which is subject to both state and federal regulation, a more coherent national policy is needed to ensure that U.S. corporations and consumers have an adequate infrastructure in place for the future, the report said.

The Council on Competitiveness is a nonprofit coalition of representatives from industry, organized labor and education. Members of the council from large companies include Aetna Life and Casualty Co., American Express Co., the American Stock Exchange, The Boeing Co., Ford Motor Co., General Electric Co., Martin Marietta Corp. and the New York Stock Exchange.

Council members representing universities include California Institute of Technology, Johns Hopkins University, Massachusetts Institute of Technology, the University of Notre Dame, Rensselaer Polytechnic Institute and Stanford University.

The report lays out five main recommendations for all technology sectors and includes some suggestions specific to the unique aspects of the telecommunications industry.

The report first called on President Bush to make technology a higher priority of the government by increasing federal funding of research and development in generic technologies. The report also calls for greater cooperation among industry, government and universities in develop-

(continued on page 14)

WASHINGTON UPDATE

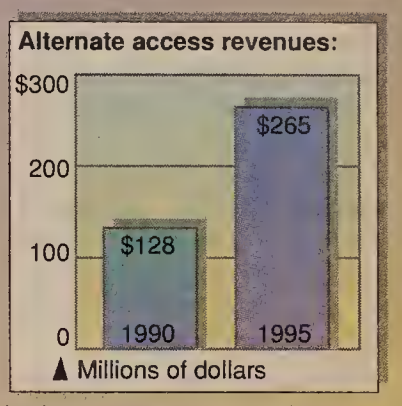
BY ANITA TAFF

AT&T combats MCI's bundling complaint. AT&T last week filed legal documents seeking more information about a complaint MCI Communications Corp. filed late last year alleging that AT&T is illegally bundling 800 and Software-Defined Network services. The Federal Communications Commission last year ruled that, because AT&T still retains a dominant position in the 800 market, it should not be allowed to offer customers packages bundling 800 with SDN. The agency said that such bundled service packages would allow AT&T to unfairly leverage its position in the 800 market to sell other services.

Although AT&T dropped its efforts to offer packaged 800 and SDN services, MCI complained that AT&T is using an SDN feature, known as Network Remote Access (NRA) Option III-Express, to get around the ban. The feature allows customers at off-network locations to dial into an SDN using an 800 number. MCI says it knows of several customers that are able to use their existing 800 numbers for the NRA Express feature with no changes to their service. This amounts to purchasing 800 services at cheaper SDN rates, MCI said in its complaint. MCI has asked the FCC for unspecified damages to compensate for business it lost to AT&T due its use of the NRA feature. AT&T in turn asked MCI to specify exactly how much it believes it lost during each month the NRA feature has been in effect.

The attraction of bypass carriers

1. Offer diverse routing.
2. Offer cheaper access service.
3. Provide more reliable service.
4. Are more responsive to customer needs.
5. Provide service and solve problems more quickly.
6. Offer fiber-based service vs. telephone company-provided copper links.



SOURCE: CONNECTION RESEARCH REPORT, GLASTONBURY, CONN., AND *NETWORK WORLD*
GRAPHIC BY SUSAN J. CHAMPENY

Dissatisfied users looking beyond Bells

Alternative access carriers win traffic from firms that want improved service, more route diversity.

By Bob Wallace
Senior Editor

In search of improved responsiveness, higher quality service and sorely needed route diversity, many large users are moving traffic from Bell operating companies to alternative access carriers.

Although some of the local exchange carriers are taking steps to address customer needs better, users say the carriers have been slow to respond to inquiries about issues such as diverse routing and then often propose plans with big price tags.

"There seems to be a lack of appreciation on the part of the [local exchange carriers] about the access needs of their large customers," said Phillip Evans, president of the International Communications Association (ICA) and telecommunications director for FMC Corp. in Dallas. "They're very slow to respond, and the prices they quote are inordinately high."

FMC has spent years trying to get Southwestern Bell Corp. to provide affordable diverse access. "We told Southwestern Bell we wanted physically diverse local access and invited them out to our facility to talk about it," Evans recalled.

"They finally came out a year later and then took six months to quote us a price," Evans said. "Their price was exorbitant, so we showed them what it would cost us to provide the diversity ourselves. They took months to study that information. It's been three years since we initiated the discussion, and I don't think we're any closer to a solution."

John Gasek, telecommunications manager for Bear, Stearns & Company, Inc. in Chicago, said his firm uses alternative access "because we need diverse routing, they're more responsive than our local telephone company and their service is far more reliable." Gasek manages the exchange floor services for three Chicago exchanges.

"I measure quality of service by the amount of problems I hear about from end users," Gasek said. "And I receive nine times more trouble tickets on Illinois Bell [Telephone Co.]-provided local access than on Metropolitan Fiber Systems [Inc.] alternative access." Bear, Stearns began using MFS circuits in late 1989 to link its Chicago site to AT&T, MCI Communications Corp. and US Sprint Communications Co. points of presence (POP).

> Users say the carriers have been slow to respond to issues such as diverse routing.
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The company has used its business with MFS as leverage against Illinois Bell, Gasek said. "They've already started doing things to combat MFS' presence in the local access market."

Earlier this year, Illinois Bell began to organize its account representatives into Quality Service Teams in a move designed to provide users with better customer service and quicker trouble reso-

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Big long-distance carriers moving to postalized rates

By Daniel Briere
Contributing Editor

The nation's largest long-distance carriers are steadily changing service pricing standards. Instead of multilevel, mileage-based rate tables, the carriers are launching flat-rate, mileage-insensitive services. These flat-rate structures are similar to postage-rate systems and have become known as postalized rates.

Select carriers have used postalized rates for a number of years for some nonmainstream services, such as international direct-dial services.

For most carriers, a user is charged a single rate to a foreign country, regardless of where that call originates in the U.S. A call from New York to London costs as much as a call from Los Angeles to London. This contrasts with mileage-based rates that charge a substantially different rate for coast-to-coast calls vs. regional calls.

Among the largest U.S. carriers, MCI Communications Corp. has been leading the pack in adopting postalized rates for more popular services, starting with the low-end business services.

MCI's Vision service, launched in 1990, costs 20.5 cents for all daytime calls traveling more than 100 miles. A discounted rate of 18.5 cents applies for all calls traveling less than 100 miles.

MCI's more recent offering, called Preferred, goes one step farther and does away with the split mileage bands — daytime calls are a flat 22 cents per minute anywhere in the nation. This compares with MCI's Prism Plus service, which ranges from 19.2 cents to 24.72 cents per minute, depending on mileage.

AT&T's competitive response filing last week, dubbed AT&T CustomNet Service, is its first major move toward flat-rate pricing. CustomNet-Type I rates are 12.75 cents for the first 30 seconds and 2.55 cents for each subsequent six seconds, for anywhere in the U.S. CustomNet-Type II rates are 13.5 cents for the first 30 seconds and 2.7 cents for each six seconds thereafter, for anywhere in the U.S.

This is opposed to its normal AT&T Long Distance day rates, which range from 18 cents for the first minute plus 17 cents per each additional minute to 33 cents for the first minute plus 32 cents per minute thereafter — depending on mileage.

Each of the major U.S. carriers has also moved toward providing regionalized international service, such as US Sprint Communications Co.'s Sprint World offering, which gives users a 59-cent flat rate during the discount and economy rate periods to any of 23 European countries.

Postalized rates represent the major future rate structure for long-distance carrier services, due to their appeal to such a broad range of users and carrier personnel.

Flat-rate pricing is easier to evaluate, program around, bill and maintain.

The high-end virtual network and Tariff 12 services already have postalized rates, with rates varying not by mileage but by rate period and access/egress type.

The carriers have been moving toward less time-sensitive pricing as well. Where rates used to have a call setup surcharge in the initial period, these surcharges have largely disappeared.

It is likely that soon we will not see any initial period at all, simply a six-second billing rate for each rate period. In some instances, this form of rating is already in existence, as with the credit card verification services.

"The change in philosophy is most significant," said L. Thomas Walton, president of Walton and Walton Associates, Inc. in Richmond, Va. "The initial philosophy was designed to create revenues. Rates used to be based on mileage and time of day. Obviously, the carriers feel that flat rates will not only clear up some of their difficulties in billing, but will also enhance the potential clients' ability to evaluate billing."

Walton noted that the trend is counter to one in the local exchange arena. "The LECs have been moving toward mileage-rate components in local service. Ten or 20 years ago, it used to be all flat-rate service. Now there are all sorts of measured rate plans available; they have much smaller mileage bands, but it's the same effect.

Briere is president of TeleChoice, Inc. a Montclair, N.J. consultancy.

Telecom to play in world mart

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ing generic technologies.

A third recommendation calls for universities to tailor their research efforts and curricula to be more relevant to the needs of industry. The report states that U.S. corporations should expend more resources on bringing generic technologies into the marketplace as commercial products. They should evaluate the R&D funding levels of competing countries and set those levels as a benchmark in the U.S.

The fifth recommendation of the report calls for better coordination among local, state and federal regulators and legislators on a national telecommunications policy. Specifically, the report states that a way must be found to ensure that an adequate infrastructure will be in place to support advanced technologies important to U.S. commerce.

Suggestions from other sources that new network enhancements, such as fiber-optic local loops and broadband digital data technologies, should be implemented have prompted great controversy. Consumer groups say current network services are more than adequate for most users and question why residential users should have to pay for new technologies through higher rates when it is unlikely they will benefit from those investments.

But the council's report says such arguments take too narrow a focus on the problems facing the U.S. "Residential consumer satisfaction overlooks the role telecommunications must play in sustaining and improving the competitiveness of the U.S. economy. What these indices do not show is the future potential of expanded service, particularly to commercial users, and its impact on economic growth and productivity," the report states.

Although it was not included in the report released publicly, a background study prepared for the council's report gives a detailed analysis of telecommunications technologies. It stresses three telecommunications technologies as being particularly important to the future growth of the U.S. industry worldwide.

First, the country needs to have a digital network in order to meet the increasing load of digital data traffic, the analysis concludes. Implementation of Integrated Services Digital Network is critical, says the analysis, pointing out that the U.S. lags behind other countries significantly in this area.

The report also singles out wireless technologies as one of the most important emerging areas in the U.S. "Wireless technology is important not only because of the possibility of a large nascent consumer market, but also because wireless communications can be an influential factor in improving productivity and reducing costs, especially in service sector applications." It also points out that wireless technologies still face significant obstacles in the U.S. due to the lack of available spectrum.

The third technology mentioned in the supplemental report is the installation of fiber in local loops. This is necessary to ensure that high-bandwidth service is available to all consumers.

Users looking beyond Bells

continued from page 13

lution. The BOC will launch the program this week.

The Quality Service Teams will be made up of specialists in different areas, as opposed to the current system in which an account representative handles all aspects of a user's account.

Gasek said he thinks the move will improve service because the new groups will be able to cut through channels and perform tasks not possible under the old regime. "They still have to work within tariffs, but they can do more for me in terms of responsiveness to service requests."

The First Boston Corp., an investment banking and brokerage firm in New York, uses Teleport Communications Group for fiber-based access to AT&T, MCI and Cable & Wireless North America, Inc. POPs, and 14 T-3 lines to link its New York headquarters and its worldwide data center in Princeton, N.J. Teleport is First Boston's primary access provider with New York Telephone Co. lines used for backup.

"Teleport provisions circuits more rapidly than New York Telephone, often in as little as two days," said Paul Bell, network manager for First Boston. "If you throw yourself on the floor and kick and scream, you may be able to get New York Telephone to [provision] access circuits in under a month."

According to Bell, Teleport's lines are top rate. "The Teleport facilities are higher quality, more reliable and cost less," he said. "Teleport also has great diverse routing."

Other users say they chose alternate access carriers largely because their services are less expensive.

Consider the case of Planning Research Corp. of McLean, Va. The company asked the Chesapeake & Potomac (C&P) Telephone Co. of Virginia and alternate access carrier Institutional Communications Corp. (ICC) to bid on a T-1 link between Planning Research's McLean site and a local US Sprint POP.

ICC quoted a price 30% lower than C&P's and agreed to run fiber into the company's building even though Planning Research initially intended to use only two or three T-1s.

C&P planned to support the T-1 on copper and would only run a fiber to Planning Research's building if the company agreed to initially use six to eight T-1s.

"We made our decision based primarily on price," said Betty Rutherford, communications manager for Planning Research. "ICC's bid was 30% under C&P's proposal. But we liked the idea of having the higher quality and bandwidth fiber support, so we went with ICC."

Pleased with ICC's service and support, Planning Research has increased the number of ICC T-1 links it uses to 16. This represents roughly half of Planning Research's local access.

"ICC has been very responsive to our needs," Rutherford said. "They have gone out of their way to offer us a high level of customer service."

While users such as Planning Research look to alternate access providers for lower prices, others use alternate access solely for diverse routing.

"The prime reason we decided to use alternate access services is disaster recovery," said David Petzel, vice-president of telecommunications for Piper, Jaffray & Hopwood, Inc., a Minneapolis brokerage firm. "We need access to the rest of the world even if we lose our serving central office."

> "The reason we decided to use alternate access is disaster recovery," Petzel said.
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The company has two T-1 lines between its Minneapolis headquarters and a US West Communications, Inc. central office but chose in late 1989 to add three MFS T-1s between its headquarters and the nearest MCI and US Sprint POPs.

"Carriers have had, and will continue to have, fiber cuts and other service disruptions," Petzel said. "That's why I haven't thrown all my eggs into one basket and won't."

Petzel stressed that his company did not install MFS circuits because of any dissatisfaction with US West. "US West is the best of the local exchange carriers we work with," he said. "We just had to have the protection diverse routing provides."

The Bell operating company has worked to boost the survivability of the local loop by upgrading its fiber ring to a dual counterrotating ring, which enables traffic to be sent in the opposite direction if the main route is cut. "US West has been real innovative over the last few years," Petzel said. The company is not yet using the fiber ring.

Piper, Jaffray & Hopwood has no plans to move traffic from its MFS circuits to US West's local loop, despite the availability of fiber-based "self-healing" services, but would consider using a second alternate access carrier if one set up shop in Minneapolis, Petzel said. "They'd have to offer me something I don't already have with MFS and US West," he said, "but I'd definitely consider giving them some of our business."

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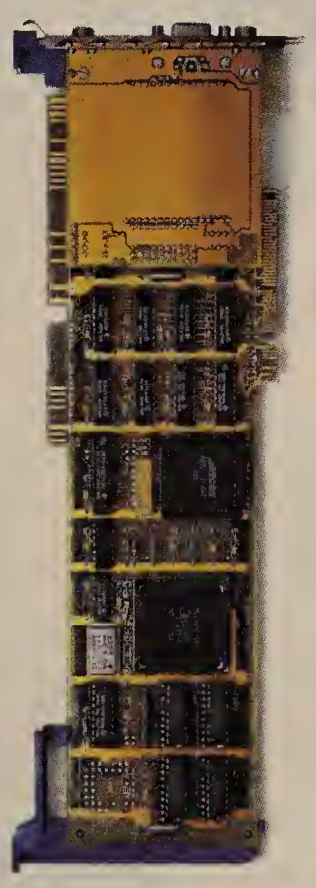

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C. Please Answer ALL Questions, Sign & Date the Form.

1 Industry: (check one only)

01. ☐ Manufacturers (other than computer/communications)
02. ☐ Finance/Banking
03. ☐ Insurance
04. ☐ Real Estate
05. ☐ Healthcare Services
06. ☐ Legal
07. ☐ Hospitality
08. ☐ Retail/Wholesale Trade
09. ☐ Transportation
10. ☐ Utilities
11. ☐ Education
12. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
13. ☐ Government State/Local
14. ☐ Government Federal
15. ☐ Military
16. ☐ Aerospace
17. ☐ Consultants (independent)
18. ☐ Carriers
19. ☐ Interconnects
20. ☐ Manufacturers (Computer/Communications)
21. ☐ VAR/VAD/Systems House
22. ☐ Distributor, Computer Related
23. ☐ Distributor, Communications Related
24. ☐ Other _____

2 Job function: (check one only)

1. ☐ Networking Management (Responsible for both voice & data)
2. ☐ MIS Management (VP, Dir., Department Head)
3. ☐ Corporate Management (Chairman, President, Owner, General Manager, CEO, CIO, VP)
4. ☐ Data Communications Management (Responsible for data only)
5. ☐ Telecommunications Management (Responsible for voice only)
6. ☐ Financial Management
7. ☐ Engineering Management
8. ☐ Consultant (Independent)
9. ☐ Other _____

3 What is the scope of your involvement in purchase decisions for Network/Communications products + services? (check one only)

1. ☐ Enterprise Wide (Organization/Subsidiary/Division)
2. ☐ Multi Enterprise (Consultants)
3. ☐ Department Wide

4 What is the total number of sites for which you have purchase influence?

1. ☐ 100+
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1

5 Your primary responsibility: (check one only)

1. ☐ Both Data + Voice
2. ☐ Data Networking Only
3. ☐ Voice Networking Only
4. ☐ None

6 Which transmission media do you use in your network: (check all that apply)

Public:
01. ☐ Switched-Based (DDD, Wats, Megacom, etc.)
02. ☐ Leased Line (not including T-1)
03. ☐ T-1
04. ☐ Fractional T-1
05. ☐ T-3/SONET
06. ☐ Broadband
07. ☐ ISDN

Private:
08. ☐ Satellite
09. ☐ Microwave
10. ☐ Fiber Optic

7 Is your network: (check all that apply)

LOCAL AREA NETWORK
1. ☐ Local (within building)
2. ☐ Local (in a campus environment)

WIDE AREA NETWORKS
3. ☐ International
4. ☐ National
5. ☐ Regional (several states)
6. ☐ Metropolitan

8 What is your network architecture? (check all that apply)

1. ☐ SNA
2. ☐ DECNET
3. ☐ OSI
4. ☐ GOSIP
5. ☐ MAP/TOP
6. ☐ TCP/IP
7. ☐ DCA (UNISYS)
8. ☐ OTHER _____

9 What is your LAN Operating System? (check all that apply)

01. ☐ 3COM (3+, 3+open)
02. ☐ LOCAL TALK (APPLETALK)
03. ☐ BANYAN (VINES)
04. ☐ DCA (IRMALAN)
05. ☐ IBM (LAN Server)
06. ☐ IBM (PC LAN PROGRAM)
07. ☐ MICROSOFT (LAN MANAGER)
08. ☐ UNGERMAN BASS (NET/1)
09. ☐ NOVELL (NETWARE)
10. ☐ TOPS
11. ☐ PROTEON (PRONET)
12. ☐ OTHER _____

10 What is your LAN environment? (check all that apply)

1. ☐ 4M TOKEN RING
2. ☐ 16M TOKEN RING
3. ☐ ARCNET
4. ☐ ETHERNET
5. ☐ STARLAN
6. ☐ FDDI
7. ☐ LOCALTALK
8. ☐ 10BASET
9. ☐ OTHER _____

11 Which operating systems do you utilize? (check all that apply)

1. ☐ IBM DOS (VSE)
2. ☐ UNIX
3. ☐ OS/2
4. ☐ OS/2 Extended Edition
5. ☐ MVS
6. ☐ VM
7. ☐ VMS
8. ☐ XENIX
9. ☐ PICK
0. ☐ OTHER _____

12 Please indicate by vendor the number of mainframes/minicomputers installed in your network.

VENDOR	MAINFRAMES A	MINIS B
01. DEC		
02. IBM		
03. AMDAHL		
04. AT&T		
05. BULL HN IS		
06. NCR		
07. DATA GENERAL		
08. WANG		
09. HEWLETT PACKARD		
10. PRIME		
11. TANDEM		
12. UNISYS		
13. CONTROL DATA		
14. OTHER		

13 Please indicate by vendor the number of microcomputers/workstations:

A. Presently installed in your network.
B. The approximate quantity you plan to install in the next 12 months.

MICROCOMPUTER/ WORKSTATION/ VENDOR	PRESENTLY INSTALLED A	PLAN TO INSTALL NEXT 12 MONTHS B
01. PCs based on 80286 chip		
02. PCs based on 80386 chip		
03. PCs based on 80486 chip		
04. 8086/8088		
05. Macintosh		
06. RISC-based workstations		
07. UNIX-based workstations		

14 What is your planned PC standard? (check all that apply)

1. ☐ EISA
2. ☐ MCA
3. ☐ NUBUS (MACINTOSH)

15 For which areas outside of the U.S. do you have purchasing influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East

16 Check ALL that apply in columns A and B

A) I am presently involved in the purchase process for the following products/services:
B) I plan to purchase the following products/services in the next 12 months:

Presently Involved A	Plan to Purchase B	
		SOFTWARE:
17. ☐	☐	Network Management
18. ☐	☐	Micro to Mainframe
19. ☐	☐	Network Security
20. ☐	☐	Call Accounting
21. ☐	☐	Distributed DBMS
22. ☐	☐	Communications Software
23. ☐	☐	Applications Software
24. ☐	☐	Network Operating Systems Software
25. ☐	☐	EDI Software
26. ☐	☐	E-Mail Software
A	B	**DATA COMMUNICATIONS:**
27. ☐	☐	Modems (over 9.6kbps)
28. ☐	☐	Modems (under 9.6kbps)
29. ☐	☐	T-1 Multiplexers
30. ☐	☐	T-3 Multiplexers
31. ☐	☐	Fractional T-1 Multiplexers
32. ☐	☐	Data Switches
33. ☐	☐	Matrix Switches
34. ☐	☐	Packet Switches
35. ☐	☐	Protocol Converters
36. ☐	☐	Network Management Systems
37. ☐	☐	Terminal Emulation Boards
38. ☐	☐	Facsimile Machines
39. ☐	☐	Diagnostic Test Equipment
40. ☐	☐	DSU/CSU
41. ☐	☐	Data Security
42. ☐	☐	Data Compression Equipment
43. ☐	☐	Network Adapter Boards
44. ☐	☐	Microwave
45. ☐	☐	Messaging Software
A	B	**TELECOMMUNICATIONS:**
46. ☐	☐	PBXs (over 1000 lines)
47. ☐	☐	PBXs (200 - 1000 lines)
48. ☐	☐	PBXs (under 200 lines)
49. ☐	☐	Key Systems
50. ☐	☐	Automatic Call Distributors
51. ☐	☐	Voice Messaging Systems
52. ☐	☐	Video Teleconferencing Systems
A	B	**SERVICES:**
53. ☐	☐	Switched Voice
54. ☐	☐	Dedicated Leased Line
55. ☐	☐	T-1
56. ☐	☐	T-3
57. ☐	☐	Digital Data
58. ☐	☐	Packet Switched
59. ☐	☐	Centrex
60. ☐	☐	Central Office Lan
61. ☐	☐	Satellite
62. ☐	☐	On-Line Information
63. ☐	☐	ISDN
64. ☐	☐	EMail
65. ☐	☐	VSAT

17 Estimated value of networking equipment and services:

A: Which you helped specify, recommend or approve in the last 12 months?
B: Which you plan to help specify, recommend or approve in the next 12 months?

A	B	
1 ☐	☐	$100 million and over
2 ☐	☐	$50 - $99.9 mill
3 ☐	☐	$25 - $49.9 mill
4 ☐	☐	$20 - $24.9 mill.
5 ☐	☐	$10 - $19.9 mill.
6 ☐	☐	$5 - $9.9 mill.
7 ☐	☐	$1 - $4.9 mill.
8 ☐	☐	$500,000 - $999,999
9 ☐	☐	Under $500,000

18 Estimated gross annual revenue of your entire company/institution: (check one only)

1. ☐ over $10 billion
2. ☐ $1 to $9.9 bil.
3. ☐ $500 to $1 bil.
4. ☐ $100 to $499.9 mill.
5. ☐ $50 to $99.9 mill.
6. ☐ $10 to $49.9 mill.
7. ☐ $5 to 9.9 mill.
8. ☐ under $5 mill.

19 Estimated number of employees for your entire corporation:

1. ☐ over 10,000
2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999
4. ☐ 1,000 - 2,499
5. ☐ 500 - 999
6. ☐ under 500

20 Which of the following ISDN products do you plan to purchase in the next 12 months? (check all that apply)

1. ☐ Basic Rate Interface Terminal Adapters
2. ☐ Primary Rate Interface Equipment
3. ☐ Voice/Data terminals
4. ☐ Voice-only terminals
5. ☐ Data-only terminals

21 From which of the following vendors will you consider buying your PBX/Central Office Switch? (check all that apply)

A PBX	B COS	
A ☐	☐	AT&T
B ☐	☐	ALCATEL
C ☐	☐	ERICSSON
D ☐	☐	FUJITSU
E ☐		HARRIS
F ☐		HITACHI
G ☐		ROLM
H ☐		INTECOM
I ☐		MEMOREX TELEX
J ☐		MITEL
K ☐	☐	NEC
L ☐	☐	NORTHERN TELECOM
M ☐		SAMSUNG
N ☐	☐	SIEMENS
O ☐		STROMBERG-CARLSON
P ☐		TOSHIBA
Q ☐	☐	OTHER _____

(continued on next column)

NETWORK WORLD
The Newsweekly of Enterprise Networking Strategies
An IDG Publication

91NN

DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

The First National Bank of Chicago is expanding its automated teller machine network by placing InterBold ATMs in five Chicago-area McDonald's restaurants under a pilot project. If the test succeeds, the bank will install the IBM-Diebold, Inc. jointly developed ATMs in 15 to 20 additional restaurants.

Data Packets

Last week, **Micro-Integration Corp.** announced a single terminal-emulation board that enables DOS-, Microsoft Corp. Windows- or OS/2-based microcomputers to access IBM Application System/400, System/36 or System/38 minicomputers as IBM 5250 terminals via twinaxial or twisted-pair wire links.

The Cumberland, Md.-based company said its Bluelynx 5250 Local board comes in two versions, one for the Industry Standard Architecture bus and another version for the Micro Channel Architecture bus.

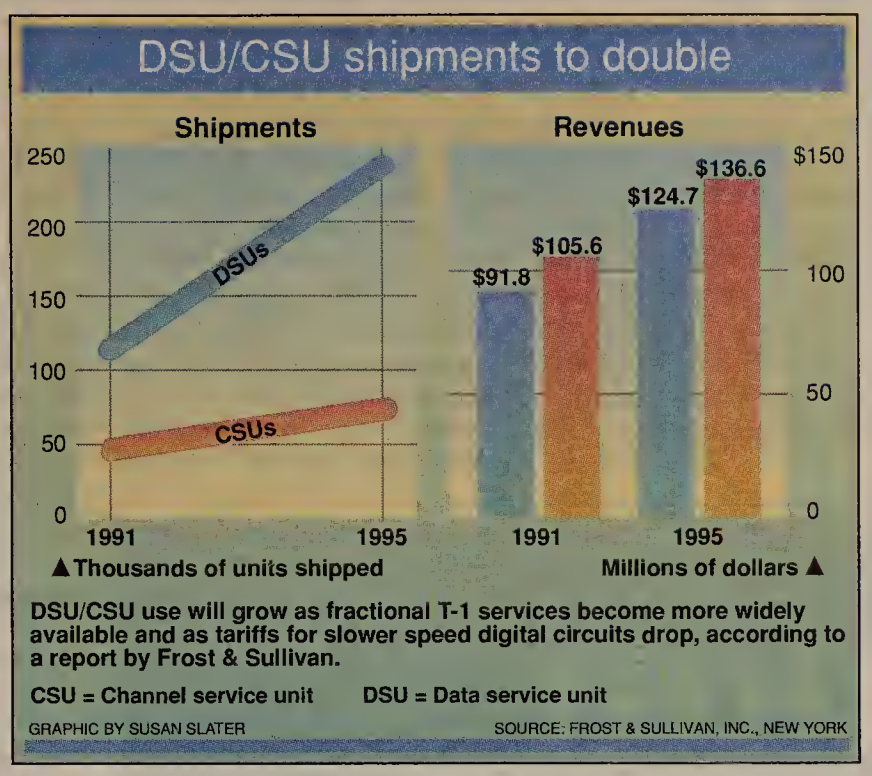
Priced at $895, the board comes bundled with emulation software that supports as many as seven concurrent emulation sessions.

When ordering, customers need to choose the emulation software for DOS, Windows or OS/2.

Users moving to a different operating environment can purchase a $295 emulation software upgrade rather than a new board and emulation software.

Although the board is available now, only DOS and OS/2 emulation software is immediately available.

Windows-based emulation software is scheduled to ship starting on May 15.



DECmcc Director Version 1.1 expected this month

Release follows two-month development delay.

By Jim Brown
Senior Editor

MAYNARD, Mass. — Digital Equipment Corp. is expected to ship the second release of its DEC Management Control Center (DECmcc) Director integrated network management software later this month, following a two-month development delay.

The cornerstone of its Enterprise Management Architecture, Version 1.1 of the VMS-based software was scheduled to ship in late January but was delayed while DEC finished work on a graphical user interface.

Users asked the company to improve the appearance of icons and map features built into early versions of the software. Those elements are small parts of the overall product but ones that were deemed important by users, said Anthony Viola, DEC's product marketing manager for network management products.

"It is not uncommon to delay things when we weigh putting in more functions or refining the ones we've announced," he said.

"That is the only piece of the product that caused any kind of slippage," Viola said. "It wasn't going to make much of a difference for us to delay it slightly in order to get it a little bit better."

Requests to improve the icon and map appearances came from an undisclosed number of beta sites as well as users attending DECworld events, Viola said. "We have a reasonably good idea of what our users are expecting in this product space. When you're able to put engineers in front of customers, you can get information from the user to the people doing the development."

DECmcc Director Version 1.1 is an improvement over DECmcc Director Version 1.0, which began shipping on schedule last November and featured a command-line user interface. The initial version supported monitoring and control of DECnet networks, DEC LAN Bridges, Ethernet networks and Simple Network Management Protocol-based devices.

Besides the new graphical user interface that complements the command-line interface, the new version will include a limited set of notification functions that will enable the software to kick off an electronic mail message to appropriate network operators or higher level management personnel when a specific alarm is triggered.

DEC will build unspecified enhancements into the notification feature for release in later versions of DECmcc Director.

Also being added to the new version is a feature that enables users to split a single network into many management domains, each of which can consist of specific network elements, such as modems or multiplexers, or geographical regions. A historian feature will enable users to archive and retrieve information such as network performance data and recurring problems. A performance analyzer feature will enable users to calculate network performance statistics.

Viola said joint development work that DEC is doing with Systems Center, Inc. to link Systems Center's IBM host-based Net/Master software to DECmcc Director will be finished in 1992.

Tariff 12 savings let firm upgrade its net

A 1989 arrangement with AT&T enables Litton Industries to finance subsidiary's T-1 upgrade.

By Paul Desmond
Senior Editor

WOODLAND HILLS, Calif. — The savings that Litton Industries, Inc. has realized from an AT&T Tariff 12 contract it signed in 1989 have, in large part, paid for a network upgrade that is making one of its subsidiaries more competitive.

Litton Computer Services, the data processing and networking arm of Litton Industries, took the Tariff 12 savings and upgraded its network from a 56K bit/sec backbone to a nationwide T-1 net.

The T-1 backbone will help Litton Computer Services compete more effectively in its outsourcing business, which accounts for about half of the traffic on the net.

"We could've just taken the discounts from the Tariff 12, but instead we elected to reinvest that savings back into our network," said Tom Garrity, director of centralized data communications for Litton Computer Services here. "We wanted to up the bandwidth, improve response time and get into other forms of communications — and we're doing that today."

When the Tariff 12 took effect in February 1990, Litton Computer Services had a backbone network that consisted primarily of 56K bit/sec circuits, except for a six-node T-1 net in California. The Tariff 12, which included virtual network and other voice services, provided an overall cost savings of 30% to 35% over the individually tariffed services the company had been using.

Litton Computer Services used the savings to upgrade its 56K bit/sec backbone to 22 T-1 lines. Last year, it expanded the net again to its current configuration, based on 21 Network Equipment Technologies, Inc. IDNX nodes and 29 T-1 circuits configured in a mesh design that provides at least one alternate path — and usually three or four — to every node, Garrity said.

The company operates two data centers, one here and one in Reston, Va., each outfitted with large IBM or compatible mainframes. The mainframes support Systems Network Architecture 3270-based applications

(continued on page 18)

Timeplex offers host of Link+ mux enhancements

By Paul Desmond
Senior Editor

WOODCLIFF LAKE, N.J. — Timeplex, Inc. recently announced enhancements to its Link+ family of T-1 multiplexers, including an 8K bit/sec voice compression capability, a multi-workstation net management feature and larger high-end multiplexers.

The 8K bit/sec voice compression capability is supported by a four-port I/O card that can be used with the Timeplex mini-Link/2+, microLink/2+ and Link/2+ multiplexers. Alternatively, customers can use a voice server module that can compress as many as 31 analog voice channels.

Support for 8K bit/sec voice is a catch-up feature for Timeplex. Competitors such as Avanti Communications Corp., Network Equipment Technologies, Inc. and Newbridge Networks, Inc. already support the feature, and General DataComm Industries, Inc. recently announced support for voice channels as low as 2,400 bit/sec.

Timeplex also announced a new net management capability that lets users employ multiple TimeView/2000 Network Management Systems in a network. Previously, users had to monitor their networks from the same site at all times because only one TimeView/2000 system was supported per network, said Bob Kinderlehrer, senior product marketing manager at Timeplex.

The new feature lets customers support network management functions from multiple TimeView/2000s, which run on Sun Microsystems, Inc. workstations. Users can assign management by region or shift control of the network to different sites around the globe according to the time of day.

Timeplex also announced a

(continued on page 18)

Tariff 12 savings let firm upgrade its net

continued from page 17

for Litton Industries and some 500 customers.

For both its internal and external users, the T-1 network has improved net availability due to the automated rerouting capabilities of the IDNX.

"Certainly, we've had T-1 circuits fail, but a customer has not lost a terminal session," Garrity said. "We've always rerouted and saved the session."

The T-1 net also has the bandwidth to meet new demands, such as for an imaging application used by engineers in Litton Industries' advanced electronics group. This group has a vast collection of engineering drawings that are now on microfiche and stored in file cabinets. Each of the 10 divisions within the group has its own collection and numerous personnel dedicated to the task of finding and disbursing drawings as requested by the engineers.

The company is in the process of loading those drawings onto optical disks. Engineers anywhere in the country will be able to use the network to access the disks, which will be located here. So far, four of the 10 advanced electronics divisions have 224K bit/sec links into the system. The other six should be on-line within the next six months, Garrity said.

Another bandwidth-intensive application that Garrity expects to become more important for both Litton internal users and its outsourcing business is local-area network interconnection.

"I think the cluster controllers of the world over the next couple of years are probably going to just about disappear," he said. "Everybody's going to be putting in LANs, and the gateways required to support those take more bandwidth."

Litton generally dedicates 9.6K bit/sec of bandwidth to a cluster controller, but according to Garrity, a LAN bridge or router requires a minimum of 56K bit/sec to ensure adequate response time.

"What we've done is position ourselves to have the bandwidth available for that kind of application as opposed to the old point-to-point [circuits] that we would have to run out there [prior to the T-1 net]," he said.

The T-1 net also lets Litton support different logical networks over the same physical net. That will become increasingly important as more of its outsourcing customers migrate to interconnected LANs from the 3270 host applications the majority of them use today.

It also helped Litton Computer Services secure a long-term contract with Brooks Brothers for a combination SNA/X.25 network. About 60 Brooks Brothers locations will have SNA links to the mainframe in Reston for financial processing and X.25 connections to a Sequoia Systems, Inc. processor that supports a store management system.

"Certainly, we've had T-1 circuits fail, but a customer has not lost a terminal session," Garrity said.

▲▲▲

A separate study is also under way to evaluate whether Litton Computer Services can support its own X.25 network for internal and external customers, rather than use public X.25 nets as it does today.

"With some of the attractive 800 dial-up pricing we get out of Tariff 12, we're evaluating using our own PAD for people to dial into," Garrity said.

In addition, X.25 could help the company save bandwidth now dedicated to cluster controllers. Many of those controllers are not using the full 9.6K bit/sec dedicated to them. Having multiple controllers supported off a single PAD could thus reduce the overall backbone bandwidth they require.

"We're looking at that as a means to keep us from buying that 30th or 31st T-1 circuit," Garrity said.

Timeplex offers mux enhancements

continued from page 17

new fiber connection that lets users connect two high-end Link/100+ multiplexer chassis. That increases the overall capacity of the Link/100+ to 48 T-1 or 48 European T-1 lines, up from the current 28 T-1s and 23 E-1s, Kinderlehrer said. The modules that support the fiber connection take two slots in each Link/100+ chassis when the link is configured for redundancy.

Also announced last week was an asymmetrical data link capability for the Link/2+ that lets users set up a channel with different transmit and receive data rates. The feature is targeted at satellite services, Kinderlehrer said.

All the enhancements are scheduled for availability by midyear. The voice server module costs about $10,000, while the four-port analog voice compression modules cost about $5,000 each. The asymmetrical data link modules cost $20,000 per circuit. The Link/100+ connection module costs $1,500, and pricing for the Link/100+ itself starts at $40,000.

Worth Noting

"We could have used IBM's [Token Analyzer Program] for our network analysis but with [Novell, Inc.'s] LANalyzer, you can inject bad packets onto the network to make sure ring recovery happens like it's supposed to. The LANalyzer is a more fully featured product"

Ron Persinger
Senior technical support analyst
McData Corp.
Broomfield, Colo.
A beta site for Novell's 4M/16M bit/sec LANalyzer product.

Netnotes

Rockwell International Corp. subsidiary **Rockwell CMC** announced last week that its Simple Network Management Protocol (SNMP) software for Fiber Distributed Data Interface networks is now interoperable with SNMP management stations manufactured by Hewlett-Packard Co. and Micro Technology, Inc. (MTI).

The compatibility of the software allows FDDI nodes using CMC's FDDI adapter to be managed from HP's Openview or MTI's Lance network management stations.

CMC's SNMP software conforms with Draft 5 of the Internet Engineering Task Force standard for SNMP and FDDI Station Management integration, CMC officials said.

GUPTA Technologies, Inc. of Menlo Park, Calif., has announced the SQLWindows for Oracle Client-Server System. The product is a combination of GUPTA's SQLWindows Developer's System and Oracle Corp.'s router software. The new product will enable application developers to design Oracle data base applications using SQLWindows as their front-end development tool.

(continued on page 21)

Version 4.10 of VINES will support OS/2 and Windows

New release of NOS to be unveiled at user meet.

By Eric Smalley
Senior Editor

MONTREAL — Banyan Systems, Inc. is set to release at the Association of Banyan Users meeting here this week Version 4.10 of the VINES network operating system.

VINES 4.10 adds support for client systems running OS/2 and offers increased support for Microsoft Corp.'s Windows 3.0. With this release, Windows 3.0 interacts directly with VINES, according to Banyan officials.

Previously, VINES and Windows could run on the same system but users could not access network resources from within Windows applications. With Version 4.10, Banyan offers a VINES driver for Windows 3.0.

VINES 4.10 supports both Microsoft OS/2 and IBM OS/2 Extended Edition clients. With multiple redirectors under OS/2, OS/2 clients can run more than one network operating system at a time to access servers on different networks, the officials said.

Support for OS/2 and Windows clients is in line with the direction that the networking industry is moving, industry analysts said.

VINES support for Windows and OS/2 furthers Banyan's goal of providing interoperability with Novell, Inc.'s NetWare, IBM's LAN Server and Microsoft's LAN Manager by making it possible for client systems on those networks to access Banyan servers, according to David Mahoney, Banyan's president.

"We're not trying to claim full interoperability," he said. "We still have [far] to go."

VINES users can exchange mail and files with users on the three networks, Mahoney said. Common transparent access among users of the different networks to applications, files, electronic mail and network management tools is, however, in the future.

(continued on page 21)

DG, Action Tech to port MHS to DG's Aviion line

By Eric Smalley
Senior Editor

WESTBOROUGH, Mass. — Action Technologies, Inc. and Data General Corp. have struck a deal to port Novell, Inc.'s NetWare-based Message Handling Service (MHS) to DG's Aviion Unix-based workstations.

Under the agreement, DG will port MHS to its Aviion line of Unix systems and Action Technologies will use the resulting code to port MHS to other Unix systems.

DG will make MHS part of its recently introduced Open Systems Office/pc.DAA office automation software.

With MHS for Unix systems, users will be able to have a single messaging system that spans their Unix and DOS environments. MHS is the standard messaging engine for electronic mail applications on NetWare networks. The port will be the first version of MHS for systems other than personal computers.

Action Technologies plans to port MHS to other systems offered by companies that have adopted Portable NetWare for their use.

"The real motivation is to have MHS and NetWare in the same box," said Tom White, president of Action Technologies.

Even with Portable NetWare on a Unix system, users have had to employ a personal computer and gateway software to run MHS.

A new alternative

The port will provide messaging interoperability in a mixed Unix/DOS environment, according to Nina Burns, principal of Network Marketing Solutions, a Menlo Park, Calif., consulting and research firm.

Gateways between MHS and Unix messaging systems have been the only alternative to date, she said. MHS on Unix becomes another reason to use MHS.

The X.400 messaging standard, in contrast to MHS, is well-suited to backbone networks but is "not a good solution at the LAN level in its current implementation," Burns said.

Action Technologies sold control of MHS as a standard to Novell in February but has retained the right to port MHS to other platforms.

MHS for the Aviion systems is scheduled to be available in September.

Data Access Language servers

Vendor DAL servers for:	Data bases accessed
Apple Computer, Inc. DEC VAX/VMS	Informix Software, Inc., Ingres Corp., Oracle Corp., DEC Rdb and Sybase, Inc. SQL Server
IBM MVS/TSO	IBM DB2 and Teradata Corp.
IBM VM/CMS	IBM SQL/DS
IBM MVS/VTAM	IBM DB2 and Teradata
Macintosh A/UX	Informix, Ingres and Oracle
Data General Corp. Eclipse MV	Oracle, and DG InfoDBMS and SQL
Aviion	Informix, Ingres and Oracle, and Sybase SQL Server
Novell, Inc. NetWare SQL	NetWare SQL
Pacer Software, Inc. Products for Unix platforms (including Digital Equipment Corp., Hewlett-Packard Co. and IBM)	Informix, Ingres and Oracle, and Sybase SQL Server
Tandem Computer, Inc. Guardian	Tandem NonStop SQL

GRAPHIC BY SUSAN J. CHAMPENY — SOURCE: APPLE, CUPERTINO, CALIF.

Apple licenses DAL language to 5 firms

Move designed to increase Mac connectivity with several data base management systems.

By Caryn Gillooly
Senior Editor

SAN FRANCISCO — Apple Computer, Inc. recently said it has licensed its Data Access Language (DAL) data base connectivity language to five companies, including Data General Corp., Novell, Inc. and Tandem Computers, Inc. In addition, Apple unveiled two new DAL servers.

The announcements, made here at DB/Expo '91, will broaden Macintosh connectivity and will ultimately give Macintosh users access to a wide variety of data base management systems running on local-area network servers, minicomputers and mainframes.

DAL is a connectivity language much like SQL, for example. It lets Macintosh-based applications access information from other data bases across a network using the familiar Macintosh interface.

User demand

"Certain users — large businesses and government organizations — have been pounding down the doors for this [connectivity]," said Pieter Hartsook, manager of the Macintosh research program at International Data Corp. in Mountain View, Calif. "Once we see the products [from the licensing agreements] come to market, Macintoshes will have better connectivity than DOS machines."

In addition to DG, Novell and Tandem, Apple licensed the DAL technology to Blyth Software, Inc. of Foster City, Calif., and Pacer Software of La Jolla, Calif.

Novell said it plans to develop a DAL version of its NetWare SQL relational data base server.

Currently, Macintosh clients on NetWare networks can only download data from NetWare SQL. When the new version of NetWare SQL is released, Macintosh clients will be able to update data as well.

"Once we put DAL into NetWare SQL, Macintosh clients will be able to access Novell data bases in the same way as [MS-DOS], OS/2 and [Microsoft Corp.] Windows clients," said Dwight Davis, director of marketing for Novell's Austin, Texas, division. "Though this is not a product announcement, I expect we'll have a product this year."

DG and Tandem plan to provide DAL-compatible versions of their InfoDBMS and NonStop SQL DBMS, respectively.

Macintosh can already gain access to IBM's SQL/DS and DB2, Digital Equipment Corp.'s Rdb, and offerings from Informix Software, Inc., Ingres Corp., Oracle Corp. and Sybase, Inc. through DAL servers.

A DAL server is a software gateway on the host that lets LAN clients access the data base. "It just makes DAL more available on

(continued on page 20)

CrossComm enhances ILAN routing and management

MARLBOROUGH, Mass. — CrossComm Corp. last week announced enhancements to its ILAN bridge/router that provide users with improved routing and network management on token-ring local-area networks.

The company said it has added support for the IEEE 802.5 Source Routing Transparent (SRT) standard to its ILAN unit, enabling users to either link token-ring LANs supporting IBM's source routing protocol or to establish connections between networks supporting the SRT protocols from a single ILAN unit.

"Some LANs, like [Novell, Inc.'s] NetWare 286, just don't support source routing protocols," said Tad Witkowicz, CrossComm's founder and president. "SRT support will enable users with both IBM Token Rings and other vendors' non-source routing LANs to coexist in the same enterprise network." He claimed that CrossComm is the first vendor to ship support for SRT protocols in a bridge/router.

By supporting SRT, the ILAN essentially combines an IBM source routing bridge and an IEEE 802.1D transparent bridge in a single unit. The ILAN recognizes the protocol that incoming data supports and routes it accordingly, Witkowicz said.

CrossComm also said it has enhanced its ILAN to support IBM's LAN Manager network management software. By emulating an IBM LAN Manager software agent, an ILAN can pass information to a LAN administrator about events occurring on attached LANs, Witkowicz said.

> CrossComm said it has enhanced its ILAN to support IBM's LAN Manager software.
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Until now, LAN Manager users could only employ the software to manage IBM Token-Ring Networks and IBM bridges.

"We think we're the first third party to successfully emulate a LAN Manager agent, removing user concerns that our ILAN can't pass LAN event data to IBM's LAN Manager," Witkowicz said.

ILAN support for LAN Manager will also enable the bridge/router to pass alerts to IBM's NetView host-based network management software, he added.

CrossComm said it has enhanced its ILAN software to support 4M and 16M bit/sec token-ring nets in any combination. Until now, the ILAN supported only 4M bit/sec token rings.

Lastly, CrossComm announced ExpertTest, a net management package that runs on personal computers and enables LAN administrators to isolate a network fault down to the workstation level.

Witkowicz said the product will appeal to large users that pass up the company's ExpertWatch net management service because they want to retain control of their network. Under ExpertWatch, CrossComm assumes responsibility for determining the root of a network failure and getting the net back on-line.

The enhancements are available now and are bundled at no extra charge into Release 4.0 of the ILAN software. Customers with earlier releases of ILAN software can upgrade for $1,500.

Tribe net hub for the Mac boasts high throughput

Firm claims 16-port hub can handle 16 times the throughput of conventional LocalTalk nets.

By Caryn Gillooly
Senior Editor

EMERYVILLE, Calif. — Tribe Computer Works recently introduced a 16-port hub for Apple Computer, Inc. Macintosh networks that the company says can handle as many as 16 times the throughput of conventional Macintosh nets.

According to Tribe, based here, the LocalSwitch product directs traffic from point to point on an Apple LocalTalk net, rather than broadcasting it throughout the network. This method helps eliminate traffic bottlenecks in an already slow environment.

LocalTalk networks are typically configured in a star topology and operate at 230K bit/sec. Each end node on the network is wired to a hub that acts as an electrical repeater, receiving a transmission from one workstation and broadcasting a copy of that signal to all other workstations on the network.

According to Tribe President Jim Li, no other stations can send or receive messages until the original transmission is received.

"If I'm attached to Port 1 and I want to print something on Port 12, my print job will go to every station on the network," Li said. "And if another user on Port 5 wants to send a message to Port 6, the machine has to wait until that print job finishes before it can send a message."

LocalSwitch is technically a 16-port bridge; it reads the address on the transmision and sends the print job, for example, directly to the printer without broadcasing it throughout the network. Therefore, if a user wanted to transfer a large file to another user, LocalSwitch would provide a virtual point-to-point connection between the two.

According to Tribe, LocalSwitch is designed to replace such current de facto LocalTalk hub standards as Farallon Computing's StarController. It uses the same twisted-pair adapters, phone wiring and 50-pin plugs as the StarController. In addition, once LocalSwitch is plugged in, it automatically learns the network configuration. No additional configuration is necessary.

Security

Another advantage of LocalSwitch is security, Li said. When using a conventional hub, unencrypted information is not secure as it passes through every workstation. "It's very easy to eavesdrop on the line," he said.

Because LocalSwitch provides point-to-point connections, no information passes through any station for which it is not intended.

LocalSwitch is available now for $3,495 and comes bundled with SwitchMonitor network management software.

Apple licenses DAL to 5 firms

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a LAN," said Matt Kane, an analyst at the META Group in Westport, Conn. The same software could reside on each client, he explained, but it is more efficient to have only one server on the host.

Pacer said it plans to develop DAL servers for DEC, Hewlett-Packard Co., IBM and Sun Microsystems, Inc. Unix-based platforms.

Blythe Software plans to develop DAL tool kits that will enable in-house developers to write DOS, Windows, OS/2 and Unix-based DAL client applications in order to provide access to remote DBMSs through the Macintosh interface.

Two DAL servers

Apple's two new DAL servers — one for A/UX and one for IBM's MVS/VTAM — extend the Macintosh reach even further. The A/UX version is for Apple's implementation of the Unix operating system and gives clients access to data base information on A/UX servers. The release also includes adapters that let users access data on Informix, Ingres and Oracle data bases running on an A/UX server.

The MVS/VTAM version, which supports IBM's CICS and Advanced Program-to-Program Communications, gives Macintosh users access to IBM's mainframe data bases. It comes with an adapter supporting Teradata Corp.'s DBC/1012 relational data base.

Before these licensing agreements, firms wanting to give Macintosh clients access to their data bases had to develop their own interfaces, said Lance Hoffman, DAL product manager at Apple in Cupertino, Calif. But that meant the Macintosh user would have to deal with several interfaces if the necessary information was on different data bases.

"Now instead of writing different interfaces for each data base, [these vendors] can all use DAL," he said. "One application written on the Mac can get data from a variety of back ends."

NetWare utility gathers data about node configurations

By Eric Smalley
Senior Editor

Magee Enterprises, Inc. last week released a utility for Novell, Inc. NetWare nets that provides network managers with inventory, configuration and node information for each workstation.

Network H.Q., which resides on a NetWare file server, collects information about each workstation as it is logged onto the net. A logon script in the workstation queries the unit and forwards the information to the server.

Without the software, network managers would have to check each workstation to find that information, said company President Marshall Magee. That task can take days for large networks.

Network H.Q. allows the manager to view a file on the server in order to determine user name, machine type, manufacturer, processor, base and extended memory, physical connection identification, installed device drivers, NetWare shell version, network node address, server name, ID, Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX) version, network interface card configuration and other information about each workstation.

Network administrators can define minimum configuration requirements for workstations, and Network H.Q. will report workstations with insufficient configurations or configurations that have been changed. The Network H.Q. information is reported in fixed-sized fields so it can be imported to data base or spreadsheet programs.

The user interface features pull-down menus, mouse support and context-sensitive help.

According to Magee, the company will be adding support for Apple Computer, Inc. Macintoshes in NetWare environments and is developing a version of Network H.Q. for Banyan Systems, Inc. VINES networks.

Network H.Q. requires NetWare 2.15 or later. The software costs $395 per server.

Magee Enterprises can be reached at P.O. Box 1587, 2909 Langford Road, Suite A600, Norcross, Ga. 30091, or call (404) 446-6611.

Network H.Q. allows the manager to view a file to find information about each workstation.

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Netnotes

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SQLWindows for Oracle Client-Server System is expected to be available this month for $1,995.

Shiva Corp. last week began shipping NFS/Share, which is a software package that lets Apple Computer, Inc. Macintosh users on a LocalTalk net access files on a Sun Microsystems, Inc. Network File System (NFS) server.

Shiva, based in Cambridge, Mass., said it will offer the software free with its FastPath 4 LocalTalk-to-Ethernet gateway until Sept. 1 through an agreement with InterCon Systems Corp., the developer of NFS/Share.

FastPath already comes bundled with Shiva's own K-Star software, which supports AppleTalk Phase 1 and 2, the Transmission Control Protocol/Internet Protocol, Digital Equipment Corp. DECnet and the Simple Network Management Protocol.

"Shiva's Mac-to-Ethernet hardware and InterCon's NFS/Share software are great complements," said Dan Schwinn, Shiva's president and chief executive officer. "I think this represents one of those rare win-win situations for the whole Mac-to-Unix market."

Stand alone available

In addition to offering NFS/Share free until this fall, Shiva will sell stand-alone copies for $295 each.

Shiva will provide the technical support to its NFS/Share customers.

Software stores digitized video on NetWare file server

Product enables access by net workstations.

By Eric Smalley
Senior Editor

TREVOSE, Pa. — ProtoComm Corp. recently released software that allows digitized video files to be stored on a Novell, Inc. NetWare file server and be accessed by multiple video workstations across a network.

The product, VideoComm/NV, allows users to store as NetWare files digitized video, still images and audio files created with standard Digital Video Interface (DVI) software.

DVI software allows video images to be stored as data in computer storage media. DVI files require about 150K bytes of disk space for each second of video, said Dan Heist, ProtoComm's president. Still images and audio files are of variable sizes.

VideoComm/NV, which runs on NetWare 386, is a NetWare Loadable Module. The package includes a driver that provides the interface between NetWare and Intel Corp.'s DVI system software.

The principal application for networked video is training, Heist said. Training videos are often based on CDROM, whereas networked DVI is more appropriate for environments where video files are changed frequently.

Since the DVI files are read-only, more than one user can access a video file at the same time. The maximum number of users who can simultaneously access a video file is determined by the bandwidth of the network as well as the memory and disk capacity of the server, according to company officials.

ProtoComm/NV works with Intel's DVI system software Version 2.13. Video workstations require 1M byte of memory, and servers require an Intel 386 or 486 processor and 4M bytes of memory.

A five-workstation license costs $3,800 and is expected to be available in June. The company will also release 10 workstations and unlimited workstation licenses.

VINES to support OS/2, Windows

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In addition to accessing more client systems, Banyan is boosting the interoperability of VINES with other networks by expanding its developer's tool kit, allowing developers to build applications that can be shared by client systems on different networks.

Along with VINES 4.10, Banyan will introduce Version 4.0 of the VINES Applications Toolkit that features two additional application program interfaces (API).

Mail Client is an API that developers can use to tie E-mail applications to the VINES mail transport. VINES Network and System Management is an API for tying network management applications to the network management tools in VINES. The VINES APIs are available now as Windows and OS/2 Dynamic Link Libraries.

With Version 4.10, VINES supports OS/2 APIs, including APIs to Named Pipes, according to Banyan officials. Because Named Pipes supports DOS and Windows, DOS and Windows workstations on VINES nets will be able to access OS/2-based application servers such as SQL Server, said Jim D'Arezzo, Banyan's vice-president of marketing.

"This is the most open version of VINES," D'Arezzo said. "We've doubled the size of the tool kit and added two APIs. This is the first in a series of steps to make VINES more open, more accessible, more connectable."

VINES 4.10 is scheduled to be available in June. VINES Team for 386 costs $2,495. VINES Unlimited, formerly VINES for 386 and VINES for 486, costs $7,495. VINES Symmetric Multiprocessing costs $13,995.

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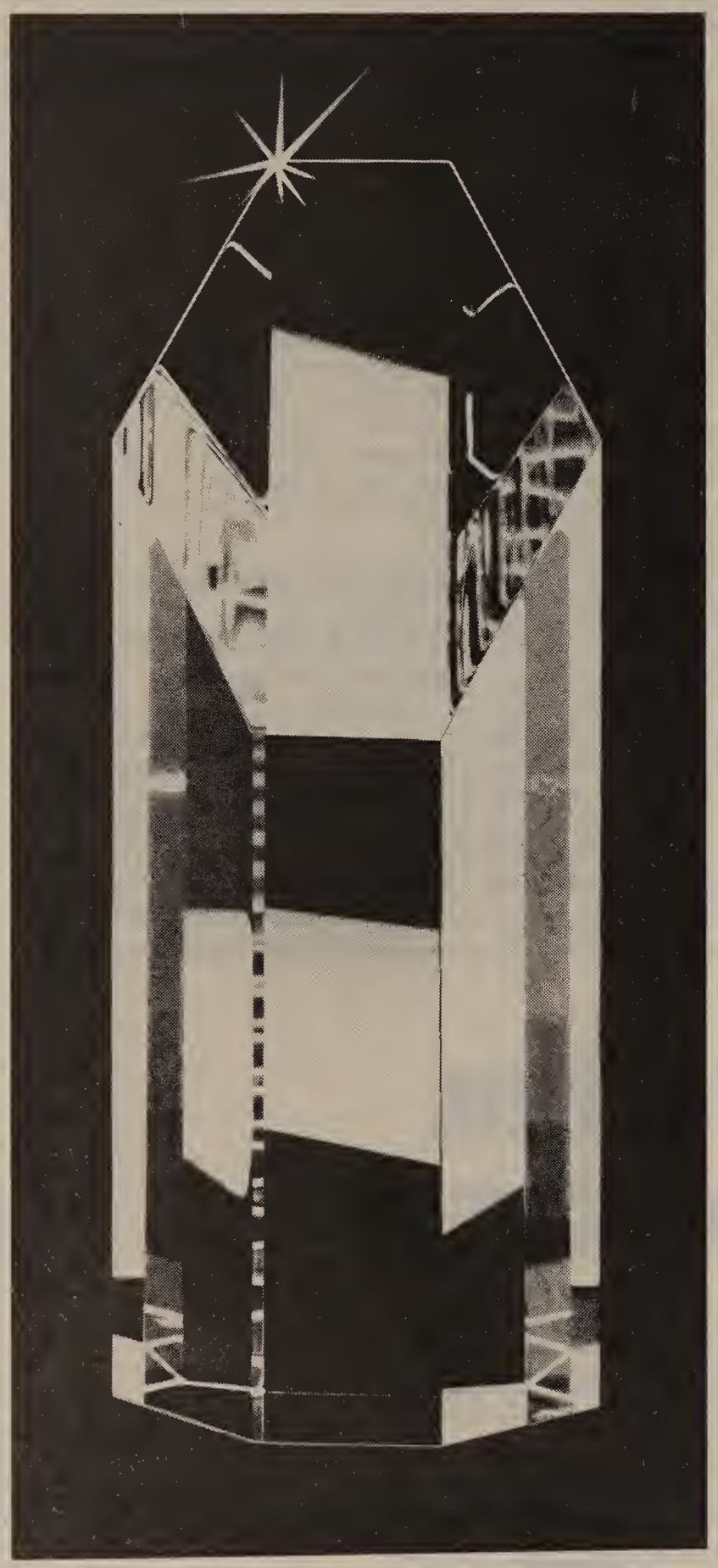

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Dialogue

Do you think the Federal Communications Commission should reassign frequencies used in microwave networks to wireless communications service providers?

"No. Our private microwave net would be in serious jeopardy if the FCC reassigns frequencies because if we're displaced, it would result in significant network replacement and re-architecture costs.

"There's testing being performed right now to see if it's possible for both microwave and wireless communications to share the same frequencies. But that has to be tested very carefully and the outcome proved to the satisfaction of both parties."

Offie Walker
Supervisor of data acquisition support
Transcontinental Gas & Pipeline Corp.
Houston

"It depends entirely on the outcome of the test currently being done in Houston to determine if the 2-GHz frequency band can be shared by both microwave users and the wireless communications service providers. I think it will be shown that the [frequency] can be shared by both users. Therefore, the FCC will probably be saved from having to make that controversial decision."

James Brammel
Manager of radio and electronic services
Ashland Services Co.
Ashland, Ky.

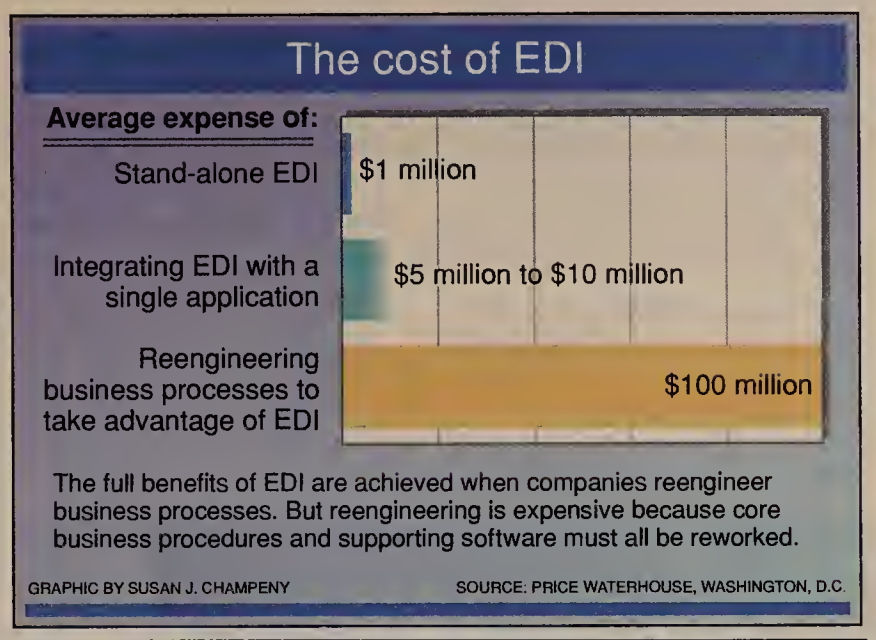
"No. This is an issue of insufficient bandwidth where there's only a finite amount to allocate. Microwave users should maintain it since they were the first ones there, so to speak.

"The task of trying to reallocate the frequencies on an equitable basis is almost impossible.

"What's the fair way to reassign it and how much goes to whom are tough questions, and I'm not sure an equitable solution exists.

"Wireless communications providers, rather than using the 2-GHz band, could use an infrared point-to-point system."

Nick Blazensky
Manager of site design
The Travelers Corp.
Hartford, Conn.



User enlists help of AT&T in readying EDI partners

One-stop shopping service speeds EDI growth.

By Maureen Molloy
Staff Writer

HARTFORD, Conn. — Pratt & Whitney has enlisted the help of AT&T to hasten the addition of new trading partners to its large-scale electronic data interchange program.

David Jordan, EDI project manager for Pratt & Whitney, the jet engine division of United Technologies Corp., said the company is off-loading the sale and implementation of EDI services to trading partners by using AT&T's EDI Enterprise Program. The carrier establishes end-to-end EDI links with new business partners before handing the supplier over to Pratt & Whitney.

The hands-off approach also relieves the company of the headaches associated with bringing trading partners up to speed on EDI.

"It's helped me to better run and manage our internal EDI program," Jordan said.

Under AT&T's EDI Enterprise Program, which was formally introduced last December, an AT&T program manager is assigned to coordinate the customer's EDI project. The manager also works with the customer to devise a plan for making EDI connections with the customer's targeted trading partners.

The value-added network (VAN) provider, rather than the customer, is largely responsible for bringing business partners up on EDI.

Similar one-stop shopping EDI services are also offered by GE Information Services and BT North America, Inc. (formerly BT Tymnet, Inc.) to their large customers.

AT&T's service calls for the VAN to work together with translation software vendors, implementation consultants and the customer's trading partners to tackle EDI projects. Jordan said such coordinated support helps speed the implementation process.

"Once a supplier is handed over to me, I know the software is running and the VAN connection has been made, so all I need to do is test the transactions," he said. "The time saved on fixing basic installation glitches is better used perfecting our internal system and implementing more EDI transaction sets."

Although AT&T is responsible for getting suppliers EDI-ready, Jordan said he is provided with weekly trading partner status reports from AT&T that keep him informed of each supplier's progress.

The report includes such information as when a trading partner was contacted to do EDI with Pratt & Whitney, when it was contacted for network service, when it purchased a network mailbox and software package, and when it began testing.

"Although I'm not involved in the actual process, I still know exactly where each trading partner is in the implementation stage and the particular problems each one may be facing," he said.

Jordan said the coordinated approach also cuts down on finger pointing by reluctant trading partners.

"EDI is new and some suppliers don't like the change, so they try to find every reason why they can't do EDI," he said. "With all the [software, hardware and network] vendors working together, the supplier has less excuses, and that alone helps step up the process."

Pratt & Whitney started its EDI

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Firms measure value of IS/net investment

Audits, end-user surveys help users determine whether IS aids in achieving business strategy.

By Wayne Eckerson
Senior Editor

Japanese firms have shown that the key to long-term success is to continuously improve existing processes and products by evaluating past performance and learning from mistakes.

Many U.S. companies, pressed by global competition and the high cost of information technology, are taking a cue from the Japanese and beginning to evaluate the effectiveness of information systems (IS) and networks in helping achieve business goals.

To make sure they're reaping the full value of information technology investments, companies are using periodic and postimplementation audits, as well as end-user surveys, to measure the impact of IS on business performance. These methods help firms determine how to distribute and harness technology resources for competitive advantage.

Last year, Sea-Land Service, Inc. established system review teams that visit corporate sites throughout the world on a rotational basis to learn if users are getting the full value from IS.

The teams comprise systems and functional experts with 20 or more years of experience within the U.S.-based shipping firm. The teams spend two weeks reviewing a site's business practices, organizational structures, systems and knowledge and use of systems. They evaluate how well the site's systems support its business objectives and whether it's making use of all the system features and functions relevant to its business practices.

The system review teams also keep records of the most effective business and system practices used at Sea-Land's more than 260 divisions. The teams share these practices — dubbed best demonstrated practices — with each division they visit, so everyone benefits, Parker said.

"The purpose is to ensure that we're getting the highest value from our IS investments," said John Parker, chief information officer at Sea-Land.

Manufacturers Hanover Corp. assesses the effectiveness of its business systems using a methodology called Quick Strike, which was developed by the bank's Strategic Technology and Research (STAR) Group in conjunction with Howard Rubin Associates in

(continued on page 24)

EXECUTIVE BRIEFS

BY WAYNE ECKERSON

On-line MBA. If you would like to get a master's degree in business administration but your busy schedule makes it difficult to get to class meetings, there is another option.

The University of Phoenix offers working adults the opportunity to earn business degrees by taking courses on-line using a computer and modem. The university's Online program offers courses leading to a bachelor's degree in business administration and master's degrees in business administration and organizational management.

Instructors issue weekly assignments to an electronic mailbox or bulletin board that functions as the "classroom" environment. Students dial into this mailbox from a personal computer in order to share ideas with other students and submit completed assignments on-line. In addition, each student and professor has a separate electronic mailbox to exchange private messages.

The Online program was established three years ago and has enrolled 340 students altogether. Thirty percent are middle managers, 44% are technical or licensed professionals, and 20% are executives or business owners. Classes are limited to 15 students each, and every course lasts five or six weeks.

Tuition for the 40-credit master's in business administration program is $250 per credit.

For more information, call (800) 888-4935.

Firms measure value of IS/net

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Rolling Pond, N.Y.

The STAR Group was established in 1986 to research and implement new technologies that can increase the productivity and competitiveness of the bank's operations and develop new methods for getting greater value out of existing systems.

Quick Strike is a 30-day assessment in which consultants from the STAR Group and Howard Rubin Associates perform a top-to-bottom analysis of IS performance within a particular business unit or division. The Quick Strike team reviews a variety of factors, including business objectives, costs, architectures and development platforms.

The results are compared with industry benchmarks compiled by Howard Rubin Associates. The Quick Strike team then recommends the steps the division can take to achieve its business objectives better. This can include reorganizing IS, redesigning business processes and improving communications between IS and the business unit.

"Quick Strike enables business units to determine whether they are getting the full value from their IS investments," said Marc Linder, vice-president at Manufacturers Hanover and former head of the STAR group.

One Quick Strike assessment at Manufacturers Hanover identified ways in which a corporate group could reduce IS expenditures by $1 million without diminishing functionality or service. Another assessment concluded that a business unit should allocate one-third of its $3.2 million systems development budget to develop new systems and applications for exploiting emerging market opportunities.

The STAR Group markets Quick Strike to business units or divisions within the bank. The initial 30-day assessment costs $30,000, which covers the consulting work by Howard Rubin Associates and use of its benchmarks.

UJB Financial Corp. in Princeton, N.J., conducts postimplementation audits to determine whether newly deployed systems are meeting objectives.

Ninety days after a new system has been implemented, a team comprising a UJB bank auditor, a member of the IS group and a user evaluates the effectiveness of the new system. The results are then published and reviewed by a committee within the bank that oversees technology usage.

Other than audits, companies use surveys to track system performance and user satisfaction.

Chevron Corp., for example, sends out an annual questionnaire to end users. The survey attempts to measure the benefit users perceive they are getting from systems against their expectations, said Jay Stright, manager of the company's human resources information systems group.

"We try to measure the gap between what people perceive they want against what they perceive they're getting," Stright said. "Notice the word 'fact' doesn't enter into the analysis." The survey asks the same questions each year and establishes a benchmark against which the human resource IS group evaluates its performance. The results of the survey are published in a monthly newsletter the group issues to its end users.

AT&T readying EDI partners

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program two years ago with six suppliers and is currently trading documents electronically with 350. The company saw EDI as one step it could take to reduce the time between order and delivery of a jet engine, as well as a way to reduce the more than two million paper documents Pratt & Whitney sends to suppliers each year.

It now has its sights set on linking up 1,000 of its 5,000 suppliers within two years.

By the end of the year, the company expects to have 750 suppliers — which constitute 85% of Pratt & Whitney's transactions — trading documents electronically.

INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

World News

Spain's monopoly carrier, **Telefonica de Espana, S.A.,** last week announced plans to join the growing ranks of foreign carriers with offices in the U.S. The carrier said it is planning a reception for the formal opening of the New York headquarters of its U.S. subsidiary, Telefonica U.S.A., Inc., on April 15. Other carriers that have opened offices in the U.S. during recent years include Belgium's Regie des Telegraphes et Telephones, Japan's International Digital Communications, Inc. and Switzerland's Post, Telecommunications and Telegraph authority.

Motorola, Inc.'s satellite communications division last week said it has agreed to partner with Lockheed Missiles & Space Company, Inc. to build the 77 low-orbiting satellites that will support Motorola's Iridium, a global, satellite-based, mobile telephone and data service. Motorola plans to begin launching the 77 Iridium satellites in 1994.

The international value-added net service provider, **Infonet Services Corp.,** recently announced plans to open a new network node in Vienna, Austria. The node will be part of Infonet's global network but will be maintained by Radio-Austria Communications on the Austrian company's facilities. Radio-Austria Communications is Austria's monopoly provider of international data, telex, teletex, facsimile and electronic mail services, Infonet said.

Satellite firm IDB plans to offer int'l switched voice

Carrier to utilize U.S., foreign public net switches.

By Barton Crockett
Senior Editor

CULVER CITY, Calif. — IDB Communications Group, Inc. recently said it plans to begin offering international public switched voice services later this year.

In an interview here, Jeffrey Sudikoff, founder, chairman and chief executive officer of the international satellite service provider, said IDB likely will use its satellite facilities to originate and terminate switched traffic via U.S. and foreign carrier public net switches.

According to Jerry Simpson, IDB's director of international relations, his company plans to offer public switched voice services to complement the satellite-based, private network services the carrier already offers.

"We could offer both as a flexible package to users," he said.

> IDB plans to use INTELSAT's IDR service to support public switched services.
>
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Private net restrictions

According to Sudikoff, IDB is the largest U.S. provider of international private network services via International Telecommunications Satellite Organization facilities.

These services, called International Business Services (IBS), are the predominant means used to run international private nets into many countries where fiber-optic facilities are not readily available.

According to Simpson, satellite service providers currently are not allowed to use IBS facilities to provide switched services or to off-load IBS traffic onto the public network.

He said this restriction constrains IDB's ability to offer hybrid public and private network services to users.

To work around the restriction, Simpson said IDB is filing petitions with the Federal Communications Commission to provide public switched services to Argentina, Austria, the Bahamas, Bolivia, Brazil, Bulgaria, Chile, China, Czechoslovakia, Greece, Guyana, Hungary, India, Israel, Peru, Poland, Romania, the Soviet Union and Turkey.

IDB plans to use INTELSAT's Intermediate Data Rate (IDR) service to support public switched services between the U.S. and most of those countries, Simpson said.

IDR supports public switched, 64K bit/sec circuits that can be compressed to support five or more voice channels, he explained.

Additionally, Simpson said that in the Soviet Union and Eastern Europe, IDB expects to offer public switched services via Intersputnik facilities. Intersputnik is an international satellite system run by the Soviet Union and other East Bloc countries.

Currently, U.S. satellite service providers are prohibited from using Intersputnik facilities to provide public switched voice services. But INTELSAT and the FCC are expected to end this restriction soon and begin letting

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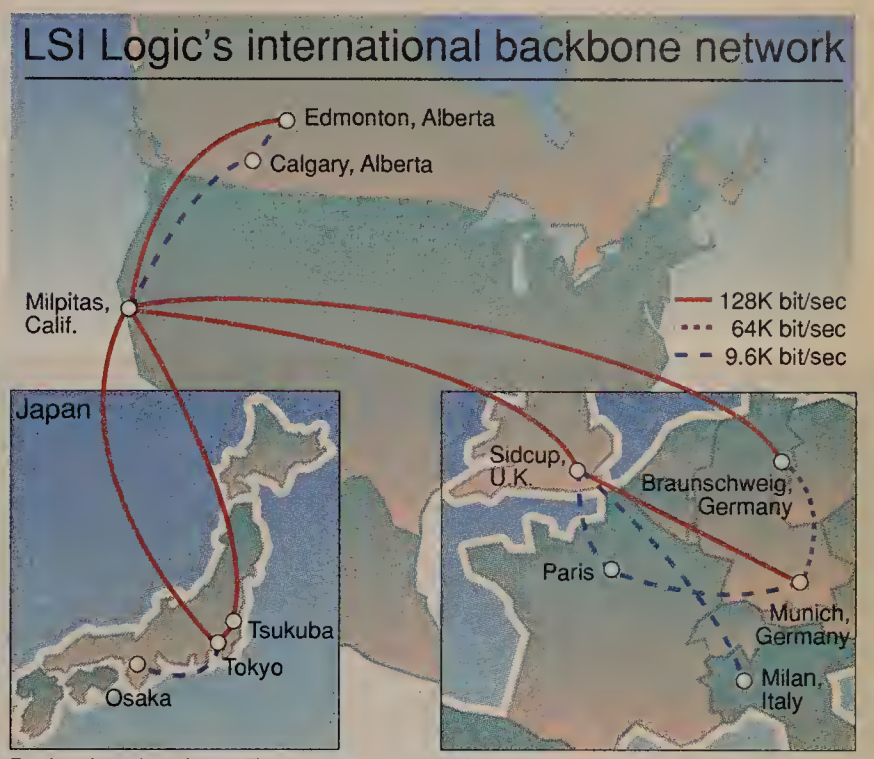

Redundant fractional T-1 lines connect Milpitas headquarters to regional sites in Europe and Japan in order to ensure uptime.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: LSI LOGIC CORP., MILPITAS

Firm uses fractional T-1 to tie int'l sites

Semiconductor maker replaces 9.6K backbone to speed design process, shorten time to market.

By Maureen Molloy
Staff Writer

MILPITAS, Calif. — Saddled with exploding capacity needs, LSI Logic Corp. recently replaced its 9.6K bit/sec backbone network with a fractional T-1 net to support the exchange of design and sales data between its headquarters here and international affiliates in Canada, Europe and Japan.

The semiconductor maker's higher speed network has resulted in shortened turnaround time in the design process and has enabled the company to reduce the time to market for its prototype chip designs. It has also provided salespeople with more timely customer information.

"We've simply outgrown our old network, and it was no longer feasible to rely on 9.6K bit/sec speeds," said Dennis Anderson, LSI Logic's manager of computing systems and application-specific integrated circuits engineering. Traffic between Milpitas and affiliates is forecasted to continue growing at an average of about 100M bytes a month.

The upgraded network that LSI Logic installed last fall replaces individual 9.6K bit/sec links with five 128K bit/sec fractional T-1 lines, linking its headquarters here to sites in Canada, Germany and Europe.

Two of the new lines link Milpitas to factories in Sidcup, U.K., and Braunschweig, Germany. These sites serve as the company's European network hubs and are linked in a mesh network with

(continued on page 28)

The body of
The heart and

a laptop. soul of a PS/2.

Introducing a PS/2 Laptop That's Full Of Features. Not Compromises.

Making a computer light enough to take anywhere and small enough to sit on a lap isn't enough. Making it perform like one that sits on a desk is the true challenge. That's why IBM has created a computer that delivers true portability without sacrificing true performance—the Personal System/2® Laptop 40 SX. At just 7.7 pounds it's clearly a lightweight computer. But it certainly doesn't act like one.

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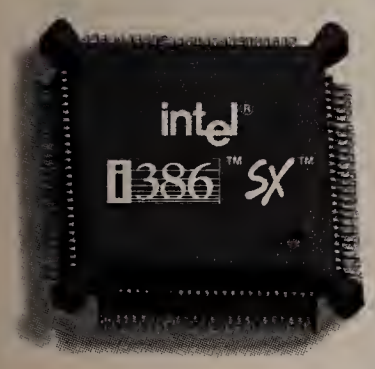
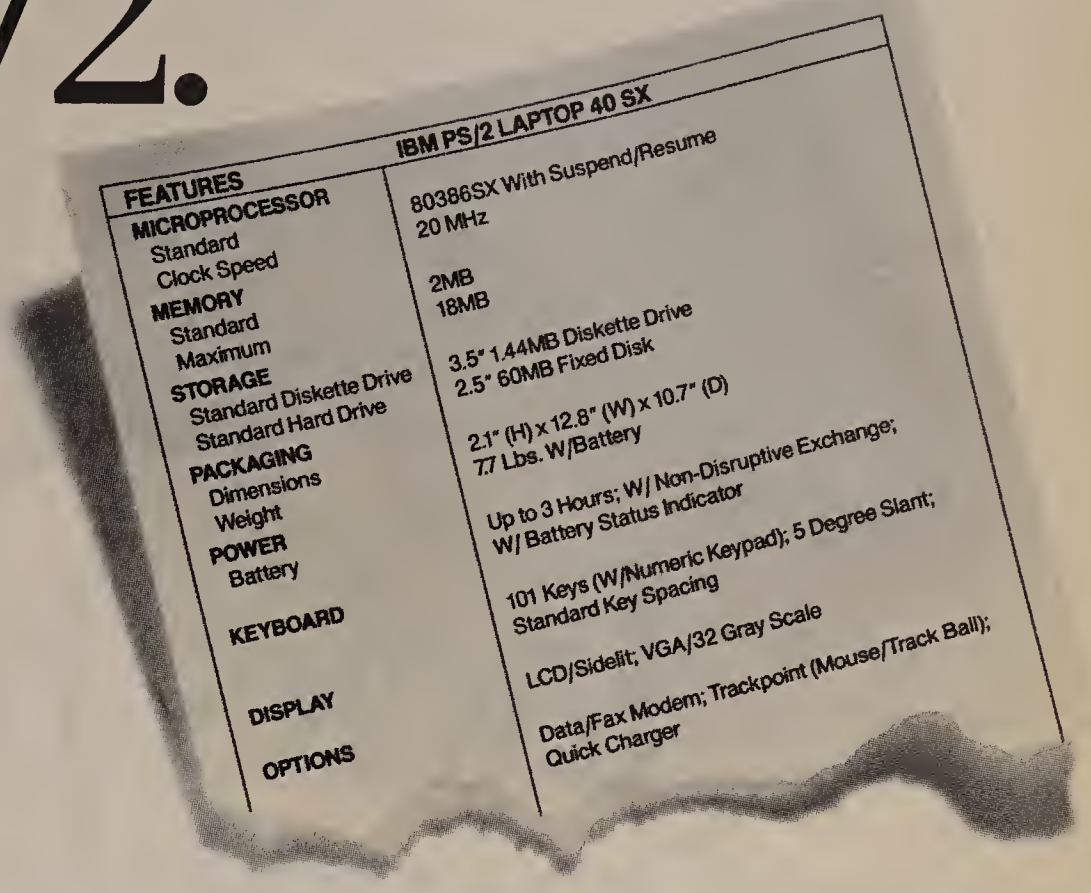


It has the same 386SX™/20 MHz processor found in best-selling desktop models. A 3.5″ 1.44MB disk drive and 2.5″ 60MB fixed disk provide fast access to programs and data, and standard 2MB RAM is expandable to 18MB.

Instead of compromising comfort by altering the keyboard, the PS/2 Laptop has a full-size keyboard spaced and arranged the same way as a desktop PS/2's. And instead of squeezing information onto a pint-size screen, it has a sidelit LCD that offers a 10″-diagonal viewing area. It delivers sharp, clear text and graphics with VGA quality in 32 shades of gray. With so much to offer, the PS/2 Laptop succeeds at being small, without being small-minded.

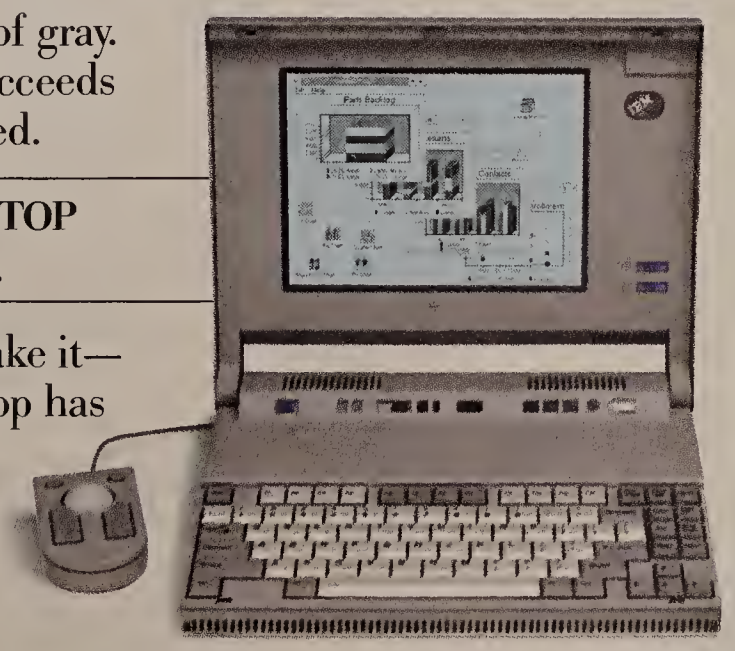
The PS/2 Laptop Is One Laptop Not To Be Taken Lightly.

IBM knows it's not how small you make it—it's how you make it small. The PS/2 Laptop has system status icons that monitor assorted functions and battery life. Extensive power management controls include the ability to change batteries in the middle of an application without exiting and a special feature that suspends power when the screen is closed, then returns to full power when reopened, resuming applications where they were left off without the need to save to the hard drive.



Of course, it comes with an AC adapter, and a 2400 BPS Data Modem/9600 BPS Fax Modem is available, as well as a special mouse that doubles as a trackball when turned over. And the PS/2 Laptop comes with something no laptop should be without—an international warranty* backed by thousands of Authorized Remarketers worldwide, so service and support are never far away.

To find out more, contact your IBM Authorized Remarketer or IBM marketing representative. You'll see why with the new PS/2 Laptop, you don't need a whole lot of room to get a whole lot of computer.



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IDB to offer int'l switched voice

continued from page 25

companies provide limited switched services via Intersputnik facilities.

In June, IDB also intends to begin offering private network and television broadcast services via the Intersputnik system, according to Simpson.

In addition to selling public switched voice services to users, IDB plans to sell public switched services to second-tier U.S. carriers and to foreign start-up carriers.

Sudikoff said smaller carriers may find it more economical to use IDB's facilities to offer international public switched voice services than to build their own facilities or resell public switched voice services from dominant carriers such as AT&T.

Additionally, IDB may use its public switched voice services internally to handle data communications between computer systems used to control the company's global satellite facilities, Simpson said.

Firm uses fractional T-1

continued from page 25

regional design centers and sales offices throughout Europe via 9.6K, 64K and 128K bit/sec lines. Full redundancy and routing diversity are provided.

Communications with international affiliates in Japan was also supported by a 9.6K bit/sec circuit, which was used strictly for communications between a mainframe here and a mainframe in Tokyo. Today, two 128K bit/sec fiber circuits link the U.S. to a design center in Tokyo and a factory in Tsukuba, Japan. The Japanese sites are linked via a 64K bit/sec circuit.

To add redundancy to the U.S.-Japan link, the company is exploring the option of routing the circuits over different fiber-optic transpacific cables.

For its Canadian affiliates, the original network linked company headquarters to Calgary, Canada, via a 19.2K bit/sec circuit. The new network, nearing completion, will link Milpitas to a Canadian hub in Edmonton via a 128K bit/sec circuit. The 19.2K bit/sec link to Calgary will later be removed, and design centers and sales offices in Montreal, Toronto and Vancouver will be tied to Edmonton via 19.2K bit/sec links.

For redundancy, LSI is exploring the option of using different fiber-optic transpacific cables.

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The new network will be able to support the transmission of large design files. The capacity limitations of the old network required the company to print files and mail them to various plants.

Anderson said an upswing in business during the past few years and the migration three years ago from a mainframe to a workstation environment drove the need for the net upgrade.

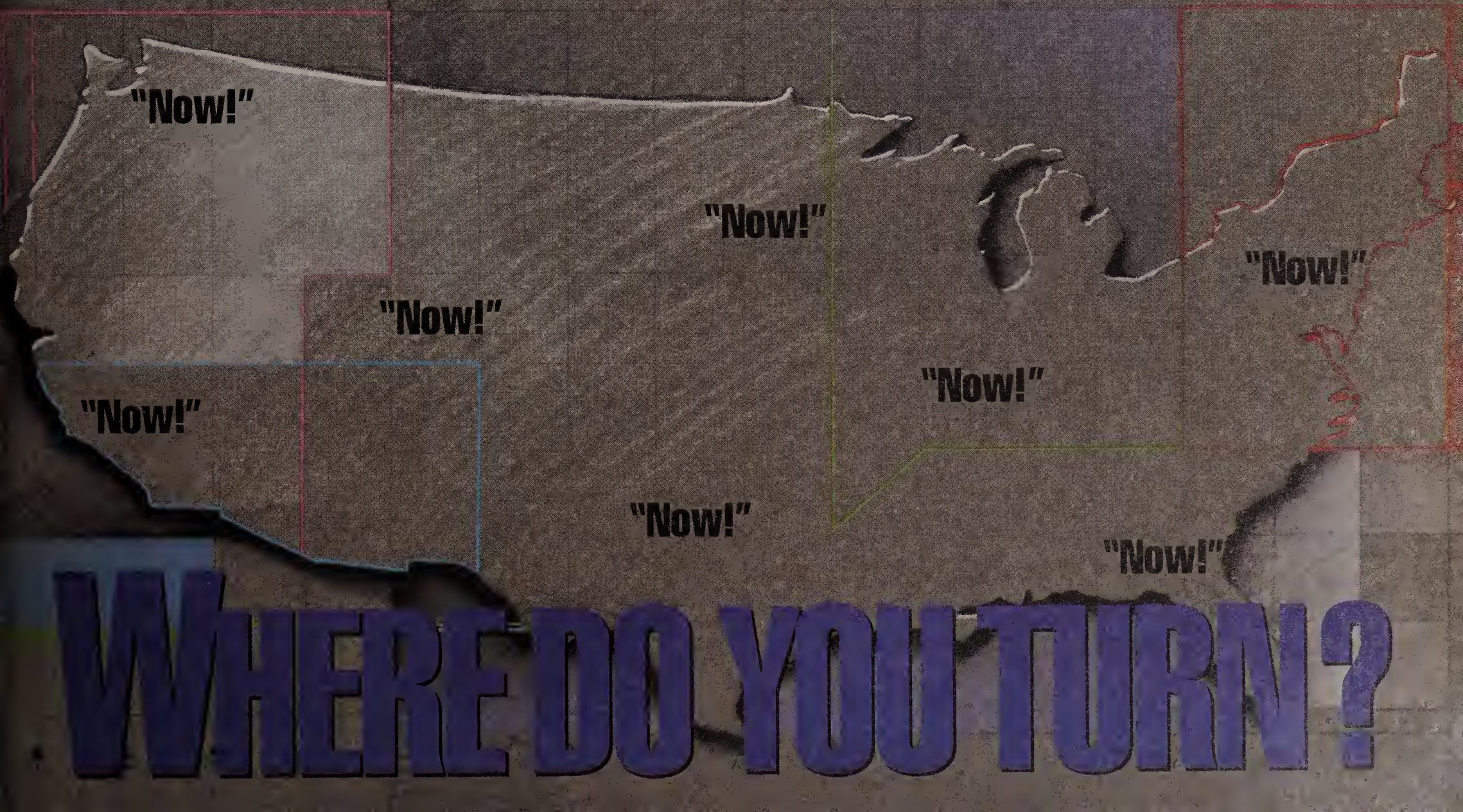
"The sheer volume of data and a need for additional applications drove the demand for a higher speed network," he said. "Without it, it would be impossible for our engineering or sales staff to have timely information."

On the original net, a computer-aided design and manufacturing file — which could be as large as 100M bytes — would take about eight hours to transmit from one factory to another, Anderson said. Using fractional T-1 lines, it takes less than an hour.

The former network was used strictly for data communications. Although data still composes 90% of the traffic, Anderson said, several channels on the fractional T-1 lines were set aside to carry voice and facsimile transmissions in order to reduce long-distance telephone bills.

"The bandwidth is there now, so we decided to take advantage of it," he said. "We'll see how much it'll be used and upgrade the circuits later if necessary."

"I want LAN-to-LAN connectivity with frame relay now!"



WHERE DO YOU TURN?

Shipper plans international net to support OLTP-based applications

By Barton Crockett
Senior Editor

SOUTH GATE, Calif. — International shipper Distribution Services, Ltd. (DSL) is planning to install a private global network to support increased traffic loads generated largely by moving batch-oriented applications to a transaction processing environment.

By installing digital communications links to company sites in the U.S. and the Far East during the next 18 months, and by enhancing bar code-based package tracking and electronic data interchange applications to operate in real time rather than batch mode, DSL believes it will gain a competitive edge over rivals.

"We'll be at the leading edge because we'll be moving more data electronically," said Kenneth Cooper, DSL's director of information services.

Installation of the private network will play a key role in the company's strategy. The first leg of the net is scheduled to go on-line in July, when DSL plans to cut over dedicated 56K bit/sec links between its headquarters here and company offices in Hong Kong and Taipei, Taiwan.

Currently, about 95% of DSL's business is generated by imports from the Far East. Offices in Hong Kong and Taipei mail as much as 50 pounds of paperwork daily to the head office to support these imports, Cooper said. The transpacific links will enable DSL to handle paperwork electronically. The $14,000 monthly expenditures on the private lines will be offset by reductions in data entry expenses.

In 1992, DSL plans to extend the network by cutting over a nationwide T-1 net interconnecting company offices in Charlotte, N.C., Chicago, Jersey City, N.J., San Francisco and Seattle with its headquarters here. Cooper said this network will be used to replace the dial-up links the company currently relies on to communicate with its 11 domestic offices. The private net will support the migration of several strategic business applications from batch mode to an on-line transaction processing (OLTP) environment. To make this move, DSL is rewriting all of its core business applications to run on a fault-tolerant OLTP computer from Stratus Computer, Inc. The company currently uses four IBM minicomputers.

Among the applications being ported to the OLTP environment is EDI. By 1992, DSL plans to support 70% of its business transactions via EDI, up from just three customers supported now. Bringing EDI applications on-line will let DSL manage inventories better by immediately updating shipment and order data.

DSL also is rolling out a new bar coding application that will rely on radio-based, hand-held scanners to communicate data instantly to host computers.

Instead of waiting 30 minutes or more for hand-held bar code scanners to upload batch data to host processors as the company now does, employees can scan shipment data into the network on the fly and move products into warehouses and onto trucks more quickly.

DSL's shipping facilities

"The Stratus [computer] will handle 150,000 transactions an hour," Cooper said. "We're going to need that to support the transaction volume we'll have."

DSL will spend about $2.5 million revamping its software and installing the new computer platform, Cooper said. The company expects the system to pay for itself in 12 to 18 months through increased operating efficiencies.

Still using dial up

Even though DSL plans to move the bulk of its traffic onto the private network, the company will continue to use dial-up links in some instances. For example, DSL will continue to use dial-up links for EDI communications.

In a study conducted by DSL, Cooper said the company found that the average cost for a domestic EDI transmission over standard dial-up lines is 26 cents per minute, while the average international EDI dial-up cost is about 50 cents per minute.

By contrast, the average cost of EDI transactions over value-added nets, a transmission media favored by many users, is $2.27 per minute. Thus, for most EDI applications, DSL will push its customers to use standard dial-up links, Cooper said.

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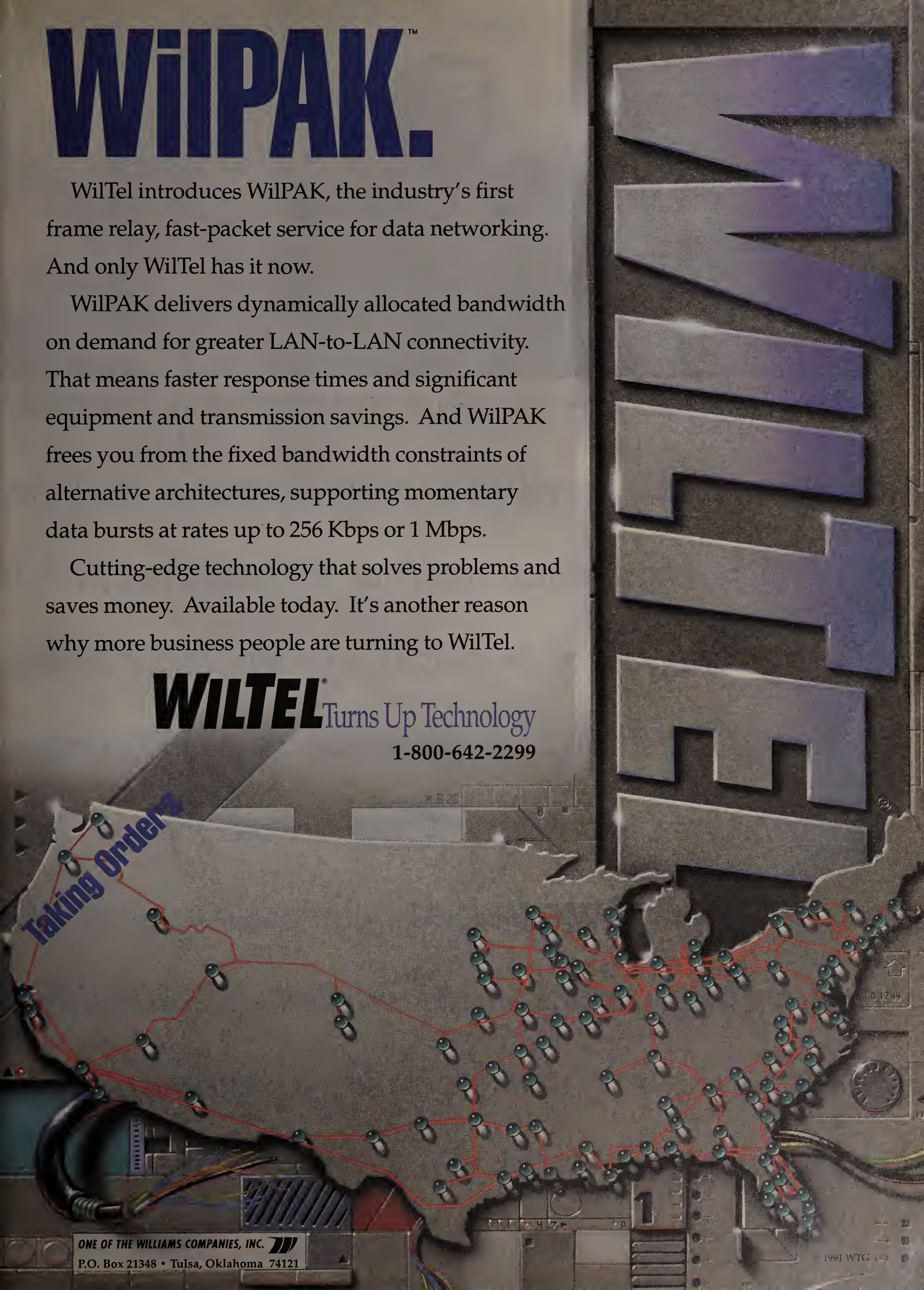

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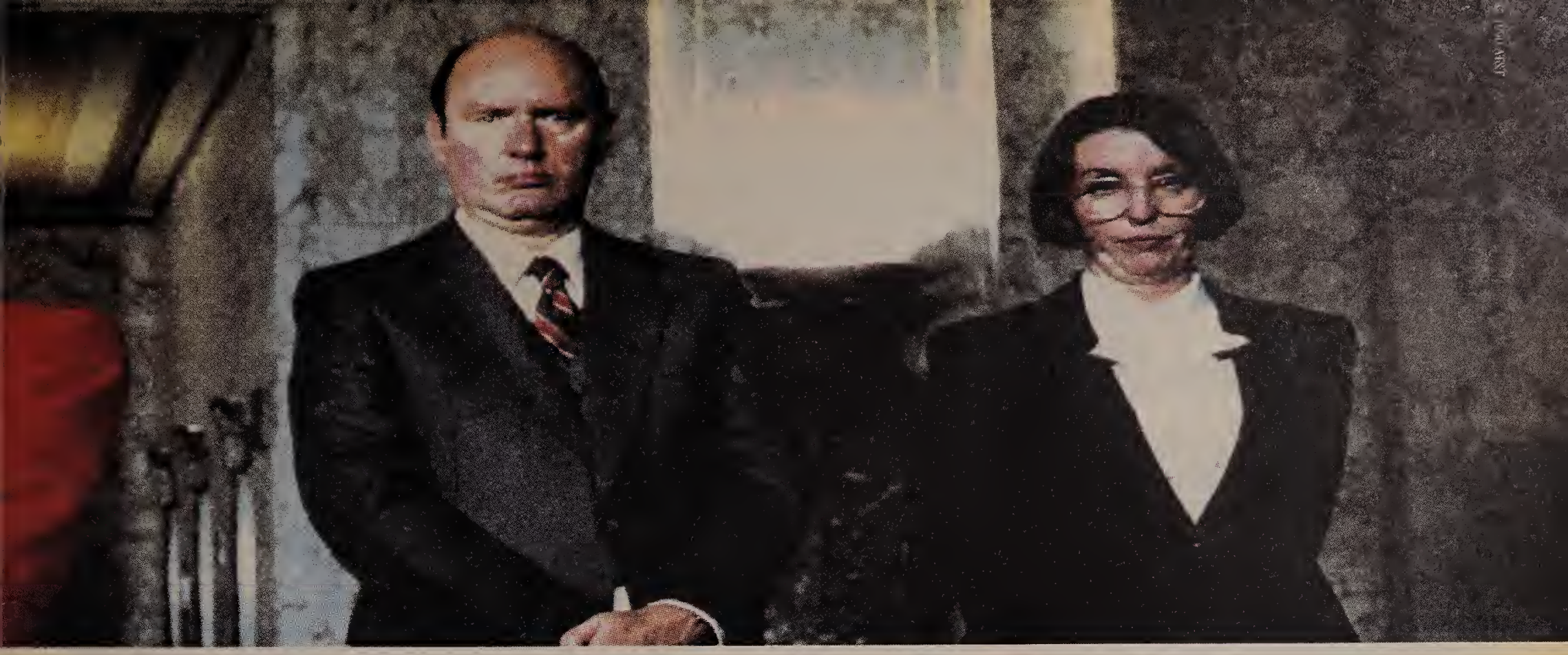

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PRODUCTS & SERVICES

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First Look

Network Systems offers interface for RISC 6000

Network Systems Corp. recently rolled out a high-speed communications interface for its Data Exchange (DX) network controllers that enables a single RISC System/6000 to support connections to as many as eight other RISC System/6000 PowerStations or PowerServers.

The company announced its **NB290** interface for its DX controllers that links as many as eight RISC System/6000 units via fiber connections to their Serial Optic Channel Converter ports.

The NB290 is a three-board set that resides in a DX4290 controller.

One board is populated with optical chips and provides the fiber connections to the RISC System/6000s, while the other two provide memory and software drivers.

The NB290 interface costs $7,000, or $11,000 when bundled with a DX4290.

Network Systems Corp., 7600 Boone Ave. N., Brooklyn, Minn. 55428; (612) 424-4888.

Xerox unveils printer link to DEC VAXes

Xerox Corp. recently announced the **Xerox Print Management Facility,** which allows several models of Xerox high-volume electronic printing systems to operate with Digital Equipment Corp.'s VAX and MicroVAX computers using VMS.

The VMS version of the Xerox Print Management Facility supports DEC's Digital Data Communications Message Protocol (DDCMP) wide-area communications protocol to provide a synchronous communications link between a DEC processor and either the 50-page-per-minute Xerox Models 4050 or 4060, or the 92-page-per-minute Xerox Model 4090 electronic printing systems.

The VMS version of the Xerox Print Management Facility costs $12,500 and will be available in the second quarter through Xerox directly.

Xerox Corp., 800 Longridge Road, P.O. Box 1600, Stamford, Conn. 06904; (203) 329-8700.

Firm touts front end for SQL Server

By Timothy O'Brien
West Coast Bureau Chief

NEW YORK — Systems Union, Inc. recently announced that it would offer a version of its SunSystems financial management software that acts as a front end for Microsoft Corp.'s SQL Server relational data base management system.

The SunSystems software will enable customers to store accounting data in the increasingly popular SQL data base format, making it possible for that data to be accessed by other SQL-compliant front-end tools such as spreadsheets.

The SunSystems programs run on workstations as clients of servers, which store data in the native table format of SQL. In previous SunSystems versions, data was stored using the Indexed Sequential Access Method (ISAM) flat file structure, which made file imports and exports more cumbersome.

"SunSystems delivers the benefits of client/server architecture to multinational corporations that are downsizing to OS/2 LAN-based financial systems," explained Dwayne Walker, senior product manager in the Server Applications Group at Microsoft.

Stewart McKie, senior vice-president at Systems Union, admitted that the market for sophisticated accounting front ends for SQL Server is just starting. "We're banking on the fact that SQL data bases are going to be an accepted platform over time," McKie said. Customer interest in this type of capability pushed Systems Union in this direction, but McKie said he does not expect the market to take off for two to three years.

SunSystems is a family of integrated accounting and business software packages grouped into two primary modules: the SunAccount module and the SunBusiness module.

The SunAccount module comprises general ledger, accounts payable, accounts receivable, costs, projects and clients. It can also translate and consolidate financial information in all currencies. The SunBusiness module, which integrates with SunAccount, manages all elements of single or multicurrency invoicing, sales order processing and inventory control.

(continued on page 57)

Davox beefs up predictive dialing system features

By Ellen Messmer
Washington Correspondent

BILLERICA, Mass. — Davox Corp. recently unleashed a wide range of features for its line of predictive dialing and intelligent workstation systems that significantly broadens their functionality and improves performance.

Expanded features for the company's predictive dialing systems include new software, a larger capacity for the entry-level Computerized Autodial System (CAS) 500, support for remote and alternate agent positions, and broader call reporting and call pacing capabilities. All new features are available now.

The system software, Data Manager II, features a more powerful and easier to use method of transferring CAS files. The software also supports a new Alternate Agent Position feature, remote access and other features previously available only on the company's larger CAS 1000 and CAS 2000 systems.

The Alternate Agent Position enables the number of agents connected to the system to exceed the number of actual active agents.

Until now, agents who logged off the system had to move to another work area so that the next group of agents could use the workstations.

The feature costs $500 per agent position.

The CAS Remote Agent software allows customers to position agents off-premises from the CAS dialing system, providing remote users with all the functions and features available to locally attached agents.

CAS Remote Agent costs $350 to $800 per agent, depending on the number of agents supported.

Davox also beefed up its CAS 500 model, expanding its capacity to support 64 lines and 32 agent positions — double its previous capacity. Prices for the CAS 500 start at $48,000.

In addition, Davox expanded the list of features on its Intelligent Workstation Systems, adding new data management capabilities.

For more information, contact Davox at 3 Federal St., Billerica, Mass. 01821, or call (508) 667-4455.

Apollo workstations double as servers

Based on HP's RISC technology, the three units offer twice the power of comparable models.

By Jim Brown
Senior Editor

PALO ALTO, Calif. — Hewlett-Packard Co.'s Apollo Systems Division recently introduced three new workstations that can double as network servers.

The HP Apollo 9000 Series 700 workstations come equipped with an Ethernet adapter board and Transmission Control Protocol/Internet Protocol software that enables them to act as a file or compute server for Unix-based workstations on a network.

Built using HP's Reduced Instruction Set Computer technology, called Precision Architecture, the new workstations and servers run HP-UX, HP's version of Unix. HP said the Series 700 Model 720, Model 730 and Model 750 are each twice as powerful as comparable models in Digital Equipment Corp.'s DECstation, Sun Microsystems, Inc.'s SPARCstation 2 and IBM's RISC System/6000 product lines.

While the three new models provide network services to other high-performance workstations on a LAN, HP said the products are not designed as servers for networks of microcomputers. "That is not the way we see these systems being used," said Iang Jeon, Series 700 product manager.

Instead, the Series 700 models will offer file storage and compute services to other workstations on the network that are running distributed computing software such as HP's Network Computing System.

All servers come with 16M bytes of RAM. The Model 720 and Model 730 can be expanded to 64M bytes of RAM, while the Model 750 can support as much as 192M bytes of RAM.

The Model 720 and Model 730 come with an Extended Industry Standard Architecture (EISA) bus supporting a single expansion slot, while the Model 750 comes with an EISA bus supporting four expansion slots.

The Model 720 can perform 57 million instructions per second (MIPS) and comes standard with an internal 400M-byte disk, which can be expanded to 840M bytes. Rated at 76 MIPS, the Model 730 server comes with two internal 400M-byte disks, which can also be expanded to 840M bytes each. The Model 720 and Model 730 can support as much as 10G bytes of external storage.

The Model 750 server is also rated at 76 MIPS and comes with a 660M-byte internal disk that can be expanded to 2.6G bytes. The Model 750 can support as much as 40G bytes of external storage.

The Model 720 server costs $15,990, the Model 730 server costs $23,990, and the Model 750 server costs $39,690.

For more information, contact HP Inquiries, 19310 Pruneridge Ave., Cupertino, Calif. 95014, or call (800) 752-0900.

LAN Manager print spooler supports PM

By Caryn Gillooly
Senior Editor

LOS ANGELES — Ultinet Development, Inc. recently unveiled a new version of its print spooling software for LAN Manager-based networks that supports IBM's Presentation Manager graphical user interface as well as the generic OS/2 command line interface.

Until now, Ultinet's Spool+ print spooler software only supported OS/2 Presentation Manager and DOS environments. This shut out dedicated 3Com Corp. servers — which do not support Presentation Manager — and any other OS/2 machines not using the graphical user interface.

Spool+ Version 1.1 now lets users share printers connected to any local workstation on a Microsoft Corp. LAN Manager, IBM LAN Server or 3Com 3+Open LAN, regardless of whether the station supports IBM's Presentation Manager graphical user interface or an OS/2 command line interface.

No windows

Spool+ Version 1.1 does not, however, support Windows-based workstations.

Spool+ Version 1.1 costs $449 and is available now.

For more information, contact Ultinet at P.O. Box 34016, Los Angeles, Calif. 90034, or call (213) 204-0111.

OPINIONS

DEALING WITH USERS

BY W.D. RILEY

E-mail: a LAN manager's worst nightmare

We used to meet face-to-face, talking about our collective problems, shooting the breeze by the water cooler. Not any more. Now everyone has electronic mail.

E-mail is just about the worst thing to happen to network administrators since the print queue. It takes seminormal people and turns them into Ann Landers rejects. You know the people I'm talking about — the ones that write to Ms. Landers with complaints ranging from acne to the national debt, as though she could do anything to help. Like Ann, I get mail from people I don't know about problems I can't solve.

My day starts off like most network administrators. I slink from my car, trying to make it to my office with as little human contact as possible, throw down a few cups of industrial-strength coffee and check the mail.

> Electronic mail takes seminormal people and turns them into Ann Landers rejects.
>
> ▲▲▲

E-mail is like a rock through the window or a phone call in the middle of the night from a heavy breather. It's about as welcome as a visiting relative with a social disease, but it's a necessary evil.

I'm particularly fond of unsigned E-mail. I'm sure the authors of these messages think they're safe in the anonymity of electronic mail and don't have a clue as to what the term "logon" means.

Following are a few of the more eloquent examples of E-mail I've received:

■ Incoming: "I demand to know why I can't get more room to store my files." My response: "After checking your logon, I found that you have 40M bytes of storage space assigned to you. The majority of your work seems to be about memo size (5K- or 6K-byte files), which you apparently want to marinate in storage until claimed by the Pulitzer committee. While we would gladly store your collected works for millennia, you may want to consider archiving files older than six months."

■ Incoming: "Every day at 5 p.m., I get a message telling me to log off and stop working. It's making me pretty tense. Stop it." My response: "Every workday at 5 p.m., we back up the network files. I know the term 'backup' is unfamiliar to you. As I recall, you didn't bother with it on your stand-alone system either, but it refers to the storage of files for safekeeping. Since our workday begins at 8 a.m. and ends at 5 p.m., we devote the after-5 hours to safeguarding our data. I applaud your dedication and the extra time you apparently give to the company. I'm sure that the squealing tires I hear in the parking lot at 4:55 p.m. can't possibly be yours."

■ Incoming: "When I stop using my machine for a few minutes, it starts falling apart. What gives?" My response: "Your machine suffers from video interruptus, a disease that takes the screen apart one piece at a time to avoid 'burn in' of your monitor. It's also known as a screen saver. Lighten up."

■ Incoming: "Why do you keep sending me mail? Do I know you? Is this stuff important?" My response: "No, you don't know me. So far, I have worshiped from afar. The mail you receive from me will be related to the operation of our network, and its importance will be left to your wisdom."

■ Incoming: "My computer's down again. I want it burned and the ashes scattered in the wind." My response: "Your calm and rational approach is greatly appreciated. Please fold your hands on your lap and sit quietly. Help is on the way." ◻

Riley is a microcomputer support manager for the City of Hope National Medical Center in Duarte, Calif.

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An IDG Communications Publication

EDITORIAL

Batter up in the now unified big league of net mgmt.

Today is Opening Day in baseball's big leagues — a day of new beginnings, when anything is possible and everyone starts with a clean slate.

Likewise, anything is possible in the network management arena, it seems, now that AT&T and IBM have announced they intend to play in the same ballpark by developing a link between AT&T's Accumaster Integrator and IBM's NetView.

Network World applauds the move as an important step toward providing users with a truly integrated network management system.

Both companies deserve credit for pushing their competitive differences aside and putting the needs of users first.

IBM deserves extra praise for its part because it has less to gain than AT&T.

IBM says it has sold more than 10,000 NetView licenses. AT&T isn't saying how many users have bought the Integrator, which makes it clear they've sold less than they had hoped.

Clearly, AT&T needs IBM far more than IBM needs AT&T — at least for now.

Of course, neither company is being completely altruistic — there are potential benefits for each of them. IBM gets a link into the premier set of tools for managing AT&T services, while AT&T gets an IBM-blessed connection to NetView for its Integrator.

But the greatest long-term benefit will be for users, which will surely gain by this kind of cooperation among major vendors.

For example, AT&T and IBM have pledged to evolve their initial offering into one based on Open Systems Interconnection protocols. It will take such vendor partnerships to make the promise of OSI a reality because the protocols alone are not enough; applications that can work together are also required.

And so it was that just before the dawn of this new baseball season, Bill Warner, director of network management in IBM's Communication Systems division, likened the AT&T-IBM alliance to the World Series — teams from separate leagues getting together to play the same game.

He noted — in our view, accurately — that the announcement represents only the first inning, a first step toward the goal of integrated, enterprisewide network management, with many more enhancements to come as the game progresses.

When it was pointed out that, ultimately, somebody wins the World Series, an IBM spokeswoman quickly chimed in, saying, in this case, users will win.

Here's hoping that she's right. ◻

OPINIONS

MAKING CONNECTIONS

BY JOHN MCQUILLAN

Future networks will take a big RISC

The microelectronics revolution continues to drive the network business forward. During the past few years, we've seen the introduction of workstations based on Reduced Instruction Set Computer (RISC) technology from most of the major manufacturers, including Digital Equipment Corp., Hewlett-Packard Co. and Sun Microsystems, Inc. A couple of years ago, a breakthrough in RISC technology occurred: The first workstations became available with a price of less than $1,000 per million instructions per second (MIPS).

In addition, HP this month is introducing a 57-MIPS workstation for only $12,000. It seems incredible, but price/performance gains in this field amount to doubling of capacity at least every year.

This has direct implications for network managers and consultants who are trying to plan networks that can keep up with the ever-growing demands of their users.

RISC chips are powering the high-end workstations and are now finding their way into devices priced under $10,000. Indeed, we can expect RISC workstations under $5,000 shortly. Such workstations can generate huge traffic flows when they load software, share files, prepare graphical images and work cooperatively.

Just as interesting, we are starting to witness the complete changeover of the communications hardware in local-area network and interconnected networks toward RISC platforms.

It was only a year ago that the first bridges to use RISC processors made their debut. Racal InterLan, Inc. introduced the LAN Net Express products based on the AMD Co. 29000 CPU — a chip rated at 22 MIPS. It gives the Racal InterLan product a high-performance profile — specifically the ability to filter up to 75K packet/sec and to forward 30K packet/sec. Other products have followed Racal InterLan's lead, including Clearpoint Research Corp.'s CMB 1000 bridge, which also uses the AMD 29000.

More recently, routers based on RISC technology have started appearing as well. Proteon, Inc. now sells the CNX 500 router, which offers 25K packet/sec of routing performance, with prices starting at $11,000 for two Ethernets and two T-1s.

> RISC chips are now finding their way into devices priced under $10,000.
>
> ▲▲▲

Network Systems Corp. is about to introduce the 6600 hybrid bridge/router for as little as $6,000 for one Ethernet and one T-1, and quoted system performance of 60K packet/sec for bridging or routing. Larger members of the Network Systems product family rely on multiple AMD 29000 processors to support high-speed interfaces.

A newcomer to this business, Coral Network Corp., has introduced a high-powered router capable of routing 50K packet/sec when linking Fiber Distributed Data Interface to DS3. Its product is also RISC-based but relies on a different processor, the Intel Corp. 960.

There is widespread speculation in the industry that most other bridge and router companies will make the transition to RISC processors in the months ahead. Some vendors are using the AMD 29000, while others may turn to the industry leaders, Intel and Motorola, Inc., because of their better software support systems.

Finally, there is some evidence that the workstation RISC manufacturers, especially Sun and MIPS Computer Systems, Inc., may play a role in developing the next generation of communications processors as well.

This tremendous improvement in price/performance is not limited to workstations and communications processors. Recently, HP introduced the newest member of the LaserJet family, the LaserJet III si, which also uses the ubiquitous AMD 29000. With this powerful processor and an improved version of the printer engine, this printer can process 17 pages per second. With the ability to support Adobe Systems, Inc.'s PostScript capability, this machine can print 15 PostScript pages per second.

And if the information isn't restricted to text, the HP Laserjet III si shows equally impressive speed for graphics output. As an added feature, it can be connected directly to an Ethernet or token ring managed by Novell, Inc. or 3Com Corp. operating systems. Think of the huge LAN traffic that will terminate on these new printers!

The work group LAN of the future might well comprise several RISC-based workstations, one or more RISC-based printers and other peripherals linked to other networks through a RISC-based bridge or router. This is a very important development.

RISC chips are improving so rapidly in their overall capability and being used very widely in all kinds of office products, it's only a matter of time before mainstream office LANs will require far greater bandwidths than they now enjoy. From there, it would be only a small step to far greater requirements for the LAN interconnection backbones that link those offices. Clearly, the arrival of RISC technology will transform networking as we know it today.

McQuillan is president of McQuillan Consulting in Cambridge, Mass. He assists users and vendors in planning communications systems.

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TELETOONS

BY FRANK AND TROISE

LETTERS

Fact manipulation

This letter responds to the recent column "A small difference turns into big savings" (*NW,* April 1) by J.A. Hooke of AT&T Bell Laboratories. Thanks for sharing the results of your studies with us.

I have never doubted that call setup time is important. In fact, that's noted in italics in my own recent column, "Seeking truth in carrier advertising" (*NW,* March 4).

But AT&T continues to miss the point. Here's why:

- In my column, I pointed out that saying substantial numbers of customers would terminate an inbound call because the call setup time was two seconds longer than 5.1 seconds was hard to believe. I was right.

By AT&T's own research, only 0.6% of customers did so. And even then, enough callers retry so that the overall number of call terminations is only 0.3% — three calls in every thousand.

- I also said AT&T misrepresented the numerical comparisons of call setup times. It's true that AT&T holds about a two-second advantage in call setup times and that this is "up to 40% higher" than the competition — proved by dividing 7.1 by 5.1. But "40%" and "two seconds" do not share the same level of magnitude. It's an old advertising trick to make something seem bigger than it is. When call setup times get down to one second for AT&T and two seconds for MCI, will AT&T run ads saying the differences are 100%?
- AT&T used the term "connect" time instead of "call setup time." If AT&T were to ask the average consumer, "How long does it take for

(continued on page 55)

Network World *welcomes letters from its readers.*

Letters should be typed and double-spaced. Mail them to Editor, Network World, *161 Worcester Road, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.

MULTIPROTOCOL

LAN SOFTWARE

Protocol options abound

CONTINUED FROM PAGE 1
works, organizations still need a comprehensive protocol to guide the evolution of their network through the short and long run.

This should address the various network- and transport-layer protocol options that abound today.

In LAN environments, these protocols operate on top of the physical and data-link layers of IEEE 802.3 Ethernet and 802.5 token-ring LANs.

These days, most net managers no longer consider using proprietary lower level LAN technologies. Included among these is Apple Computer, Inc.'s LocalTalk, which sold well for years because it was easy to set up and easy to use for connecting Apple's Macintosh computers. Now, however, LocalTalk is losing this edge because products based on newer Ethernet variants, such as 10BaseT, are becoming just as easy to install and run.

This is not to say that AppleTalk, Apple's proprietary network architecture, is dead. AppleTalk includes the higher level protocols that once ran exclusively on LocalTalk. And because of close affiliation with Macintoshes, it remains one of the half-dozen or so major network/transport protocol players with which users will have to contend for a long time to come.

However, AppleTalk no longer works only over LocalTalk. Thanks to the IEEE 802 LAN standards, Apple's latest version of AppleTalk can run concurrently

Mier is president of Mier Communications, Inc., a Princeton Junction, N.J.-based network consultancy that specializes in customized protocol analysis and planning.

with any combination of other network- and transport-layer protocols on the same Ethernet or token-ring network.

There are, however, some minor issues affecting end-to-end protocol operation over a mix of bridged Ethernets and token rings due mainly to such media access control-layer differences as the maximum frame size and source routing. These issues do not affect the selection of transport-layer protocols or restrict users to particular bridges. But they do require careful tuning of both protocol- and bridge-layer operations to assure efficient end-to-end data flow.

Layer 3 and above

No network- or transport-layer protocol suite exists as a network entity by itself. Applications, such as file transfer, run over these protocol layers. In some cases, these functions are also viewed as part of the protocol stack above the transport layer. Such higher layer protocol components include: the AppleTalk Filing Protocol; OSI's File Transfer, Access and Management (FTAM) protocol; the Unix- and Transmission Control Protocol/Internet Protocol-oriented File Transfer Protocol (FTP); and Sun Microsystems, Inc.'s more sophisticated file server protocol, Network File System.

CHART • GUIDE

A Buyer's Guide chart comparing software support in various multiprotocol environments appears on pages 40, 42 and 56.

In some cases, the protocols and interfaces that operate over a network- or transport-layer protocol suite are numerous and diverse. This is especially true with TCP/IP, where a multitude of modular higher level protocol components — Telnet, FTP, Simple Mail Transfer Protocol and even Simple Network Management Protocol — run more or less independently.

On the other hand, few — if any — other protocols can be integrated into proprietary stacks, such as IBM's Advanced Program-to-Program Communications.

This is largely because the vendors have refused to make their protocol specifications public. This action has stymied third-party vendors from creating upper layer protocol modules that ride over these proprietary trans-

(continued on page 43)

Operating in multiprotocol environments is a major challenge facing today's network managers.

Multiprotocol environments — software support (continued on page 42)

Vendor	LAN protocol environment	Primary connectivity scenarios	Software required Scenario(s)	Package	Runs on	Price	For protocol Support
Apple Computer, Inc. Cupertino, Calif. (415) 769-9669	AppleTalk over Ethernet, token ring, LocalTalk	1 - Mac clients to a Mac file server	1, 2	AppleShare File Server	Mac server	$799 per server	AppleTalk
		2 - Mac and DOS clients to a Mac file server	2	AppleShare PC	DOS client	$149 per node	AppleTalk
	NETBEUI over token ring	3 - Mac clients to DOS file server	3	SMB File Transfer Utility	Mac client	$1,250 per client (included with Mac II token ring adapter)	NETBEUI
	APPC over token ring	4 - Mac to other APPC-supporting systems and as APPC gateway for other Macs	4	MacAPPC (developers package)	Mac node	$200 per node	APPC
	TCP/IP over Ethernet, LocalTalk	5 - Mac to TCP/IP hosts for Telnet, X Window System and user-developed applications	5	MacTCP (developers package)	Mac node	$100 per node	TCP/IP
AT&T Computer Systems Morristown, N.J. (800) 247-1212	OSI over Ethernet, token ring	1 - DOS, OS/2 and Unix clients to an AT&T StarGroup Unix server	1, 2, 3, 4	StarGroup LAN Manager Server 3.4 (includes DOS and OS/2 client software)	Unix server	$2,595 (8 clients) to $3,795 per server	TOP NETBIOS (NETBIOS over OSI transport)
	NETBEUI over Ethernet, token ring	2 - DOS and OS/2 clients on an IBM LAN to IBM or AT&T StarGroup servers	2	StarGroup Server for IBM LAN clients (clients use regular IBM LAN Requestor/client software)	Unix server	$795 per server	NETBEUI
	TCP/IP over Ethernet	3 - DOS and OS/2 clients to TCP/IP hosts (OSI used to StarGroup server, which performs as a TCP/IP gateway)	3	AT&T TCP Access Program 3.4	Unix server	$1,475 per server	TCP/IP
	AppleTalk over Ethernet, token ring	4 - Mac clients to StarGroup server for AppleTalk file and print services	4	StarGroup Server for Mac clients	Unix server	$795 (8 clients) to $1,295 per server	AppleTalk
Data General Corp. Westborough, Mass. (508) 898-2684	IPX over Ethernet	1 - DOS (including Windows) and OS/2 clients to a NetWare server (AViion system running portable NetWare)	1, 2	NetWare Transport (includes DOS and OS/2 client software and Mac/PC gateway)	AViion server	$1,250 to $1,750 per server	IPX
		2 - Macs via AppleTalk/LocalTalk to personal computer gateway, then IPX to AViion server	1, 2, 3	NetWare Services	AViion server	$2,250 to $11,650 per server	IPX, TCP/IP
	TCP/IP over Ethernet	3 - DOS and OS/2 clients and terminals to AViion server (portable NetWare)	4	OpenMac/Services (PacerShare)	AViion server	$60 to $240 per Mac client	AppleTalk
	AppleTalk over Ethernet	4 - Mac clients to AViion server	3	User-supplied TCP/IP on DOS, OS/2 clients	DOS and OS/2 clients	Varies	TCP/IP
Digital Communications Associates, Inc. Alpharetta, Ga. (800) 348-3221	NETBEUI over Ethernet	1 - DOS nodes to a NetBIOS/SMB-based DOS server, with concurrent access to TCP/IP hosts	1	10NetPlus LAN NOS 4.202	DOS server and clients	$428 (3 nodes) to $1,379 (20 nodes)	NETBIOS/ SMB
			1	PC/TCP for DOS (from FTP Software, Inc.)	DOS nodes	$400 per node	TCP/IP
Digital Equipment Corp. Littleton, Mass. (508) 486-2211	DECnet over Ethernet	1 - DOS, Mac and OS/2 clients to an OS/2 mail server	1, 2, 3, 4, 5, 6, 8	Pathworks for DOS	DOS client	$195 per node	DECnet
		2 - DOS and OS/2 clients to an OS/2 server	1, 2, 3, 4	Pathworks for OS/2	OS/2 client	$195 per node	DECnet
		3 - DOS and OS/2 clients to a VAX/VMS server	1, 2	Pathworks for OS/2	OS/2 server	$295 per node	DECnet
		4 - DOS and OS/2 clients to a VAX/Ultrix server	1, 5, 6, 7	Pathworks for Macintosh	Mac client	$295 per node	DECnet, TCP/IP, AppleTalk
	TCP/IP over Ethernet	5 - Mac and DOS clients to a VAX/VMS server	7	AppleTalk for VMS	VMS server	Included with Path - works for Macintosh	AppleTalk
		6 - Mac and DOS clients to a VAX/Ultrix server	3	Pathworks for VMS	VMS server	$666 per site	DECnet
	AppleTalk over Ethernet	7 - Mac clients to a VAX/VMS server	4, 6	Pathworks for Ultrix	Ultrix server	$150 per site	TCP/IP
	DECnet and IPX over Ethernet	8 - DOS clients to both VAX/VMS and NetWare servers	5	VMX/Ultrix Connections	VMS server	$538 per server	TCP/IP
			4	DECnet for Ultrix	Ultrix server	$532 per server	DECnet
			5, 6	Pathworks for DOS-TCP/IP	DOS client	$100 per node	TCP/IP
			8	Pathworks for DOS/NetWare Coexistence	DOS client	$130 per license	DECnet, IPX
FTP Software, Inc. Wakefield, Mass. (617) 246-0900	TCP/IP over Ethernet, token ring	1 - DOS nodes, operating as clients on Vines, NetWare, DECnet, NetBIOS, or LAN Manager LANs, to TCP/IP hosts	1, 2	PC/TCP for DOS	DOS node	$400 per node ($490 with NFS client)	TCP/IP
		2 - DOS and OS/2 nodes connected as TCP/IP client/servers with other TCP/IP hosts	2	PC/TCP for OS/2 1.0	OS/2 node	$575 per node	TCP/IP

CLNS = Connectionless Network Service
FTAM = File Transfer, Access and Management
FTP = File Transfer Protocol
IPX = Internetwork Packet Exchange
LAT = Local Area Transport
NETBEUI = NETBIOS End User Interface
NFS = Network File System
SMB = Server Message Block
SMTP = Simple Mail Transfer Protocol
TP4 = Transport Protocol Class 4

This chart includes a representative sampling of multiprotocol LAN software. Other vendors may offer competitive products.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

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Multiprotocol environments — software support (continued on page 56)

Vendor	LAN protocol environment	Primary connectivity scenarios	Software required Scenario(s)	Package	Runs on	Price	For protocol Support
Hewlett-Packard Co. Palo Alto, Calif. (415) 857-1501	TCP/IP over Ethernet, token ring	1 - DOS (including Windows) and OS/2 clients to an OS/2 LAN Manager server	1	HP LAN Manager 1.1 (includes OS/2 for server, and DOS and OS/2 client software)	OS/2	$1,295 (5 clients) to $3,995 per server	TCP/IP
		2 - DOS client on LAN Manager or NetWare LAN, to TCP/IP hosts (FTP, Telnet, etc.)	2	HP Network Services 2.1	DOS node	$295 per node	TCP/IP
	TCP/IP over Ethernet	3 - DOS (including Windows) and OS/2 clients to a 386/486 LAN Manager server (Unix)	3	HP LAN Manager/X 1.1 386/486 (includes DOS and OS/2 client software)	386/486 server	$1,695 (5 clients) to $3,995 per server	TCP/IP
		4 - DOS (including Windows) and OS/2 clients to an HP 9000 LAN Manager server (Unix)	4	HP LAN Manager/X HP9000 (includes DOS and OS/2 client software)	HP 9000 server	$2,000 (8 clients) to $30,000 per server	TCP/IP
	IPX over Ethernet	5 - DOS (including Windows), OS/2 and Mac clients to a combination NetWare and LAN Manager (via TCP/IP) server (HP 3000)	5	HP LAN Manager/XL (includes LAN Manager client software)	HP 3000 server	$1,700 to $11,100 per server	TCP/IP
			5	NetWare for HP 3000 (separate PC node required for Mac gateway)	HP 3000	$6,000 to $32,000 per server	IPX
IBM Armonk, N.Y. (914) 934-4000	NETBEUI over token ring, Ethernet , IBM PC Network	1 - DOS PCs, configured as clients and/or servers	1, 2, 3	IBM LAN Support Program	DOS node	$60 per node	NETBEUI
		2- DOS and OS/2 clients (requestors) to an OS/2 data base server	2, 3, 4, 5, 6, 7	OS/2 Extended Edition O/S	OS/2 node	$830 per node	NETBEUI, APPC
		3 - DOS and OS/2 clients to an OS/2 LAN Manager-based server	1	IBM PC LAN Program	PC node	$225 per node	NETBEUI
	APPC over token ring, Ethernet, IBM PC Network	4 - OS/2 to OS/2 for remote data services, peer-to-peer applications	3	IBM OS/2 LAN Server (1)	OS/2 server	$1,040 per server	Independent
		5 - OS/2 to other APPC-supporting systems (such as AS/400 s/36)	7	IBM TCP/IP for OS/2 Extended Edition	OS/2 node	$800 per node	TCP/IP
		6 - OS/2 to LAN Gateway for remote SNA	5, 6	Appropriate APPC support on other systems	Varies	Varies	APPC
	TCP/IP over token ring, Ethernet	7 - OS/2 to TCP/IP hosts (IBM AIX, non-IBM), such as for FTP, NFS, SMTP	7	Appropriate TCP/IP support on other systems	Varies	Varies	TCP/IP
Innovus, Inc. Hamilton, Ontario (416) 529-8117	IPX over Ethernet	1 - DOS (including Windows), OS/2 and Mac clients to a NetWare server (HP 9000)	1	NetWare for HP 9000 1.01 (separate PC gateway required for Mac access)	HP 9000	$3,250 (8 clients) to $24,900 per server	IPX (TCP/IP supported concurrent with HP's LAN Manager for HP 9000 software)
MicroComputer Systems, Inc. Irving, Texas (214) 659-1514	NETBEUI over Ethernet, token ring	1 - A mix of DOS (286/3860 and Unix nodes running compatible NETBIOS/SMB applications over any of several LAN-transport environments	1	SMB/ix (includes server and DOS client software)	Unix server	Starts at $1,995 per server	NETBIOS server applications
	TCP/IP over Ethernet, token ring		1	NETBIOS/ix and Redirector/ix	Unix server	Starts at $495 per server	Interface to protocol stack
	XNS over Ethernet, token ring		1	NETBIOS protocols, and other PC-based modules	Server and clients	Varies	TOP NETBIOS (NETBIOS over OSI transport); NETBEUI; XNS; IPX; NETBIOS over TCP/IP
	OSI over Ethernet, token ring						
	IPX over Ethernet, token ring						
NCR Corp. Dayton, Ohio (612) 638-8400	IPX over Ethernet TCP/IP over Ethernet	1 - DOS (including Windows), OS/2 and Mac clients to a NetWare server (NCR Unix v.3 or v.4) with concurrent access to Unix applications	1	NCR NetWare/X 1.5 (client software for IPX ordered separately; Mac clients require a 286/386 PC gateway for Ethernet access to NCR server)	NCR server	Starts at $10,000 per server	TCP/IP and IPX

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NFS = Network File System
SMB = Server Message Block
SMTP = Simple Mail Transfer Protocol
TP4 = Transport Protocol Class 4

FOOTNOTE:
(1) LAN Manager-based server software packages, including IBM'S OS/2 LAN Server, are largely independent of the underlying LAN transport protocol(s), as well as underlying LANs. Each LAN Manager OEM implements its own LAN and LAN protocol support. IBM's OS/2 operating system provides the protocol support (NETBEUI and/or APPC) for OS/2 LAN Server. As part of its $1,040 OS/2 LAN Server package, however, IBM includes the protocol software that DOS clients require (IBM LAN Support Program). The license with the server software is good for up to 128 DOS clients.

This chart includes a representative sampling of multiprotocol LAN software. Other vendors may offer competitive products.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

(continued from page 39)

port protocols. Therefore, most users with multivendor, enterprisewide networks avoid proprietary closed protocols.

Recently, some vendors of proprietary protocols have reconsidered this strategy. Both Apple and Novell, Inc., for example, are now reportedly licensing their full protocol specifications to foster more widespread use of AppleTalk and Novell's Internetwork Packet Exchange (IPX) as general-purpose network- and transport-layer protocols.

IBM and Digital Equipment Corp., on the other hand, apparently still feel that they don't need to allow third-party access to their protocol stacks.

In contrast to these proprietary approaches, the modular, layered structure of OSI facilitates access at the transport layer. Indeed, until sufficient market impetus materializes for full, seven-layer OSI protocol implementations to proliferate, OSI will likely only be used as a network- and transport-layer protocol suite.

As shown in the chart, several vendors (including AT&T and Syntax, Inc.) provide OSI transport but currently only via a Network Basic I/O System software interface at the transport layer. This interface has been standardized in a specification called TOP NETBIOS.

Novell's new NetWare FTAM package represents a full seven-layer OSI implementation. This optional software enables a NetWare 3.11 server to act as a file server for any system similarly running an FTAM-based protocol stack. Notably, it is not a gateway and does not enable conventional NetWare DOS or OS/2 clients to communicate with OSI systems or over an OSI network.

There are many good reasons for managers to winnow the different protocols running over their organization's LANs.

▲▲▲

Competition heating up

There are many good reasons for network managers to winnow the herd of different protocols running over their organization's LANs. One of them is the complex routing and network management issues involved in interconnecting these LANs via an enterprisewide backbone network.

Deciding which protocols to keep or adopt and which to avoid or phase out is complicated by the current number of choices. The leading network- and transport-layer protocol contenders in the LAN arena today include:

- **TCP/IP.**
- **OSI.**
- **The NETBIOS Extended User Interface (NETBEUI),** also referred to as NETBIOS/DLC (for data link control) and NETBIOS-over-802.2.
- **Novell's datagram-based IPX,** usually referred to in combination with Novell's little-used connection-oriented protocol equivalent, the Sequenced Packet Exchange. Together, they are called IPX/SPX.
- **DEC's DECnet protocol stack.** The DEC-developed, LAN-only, terminal-to-VAX protocol, Local Area Transport (LAT), is also commonly used in DEC environments, but LAT is not a functional subset of DECnet.
- **IBM's APPC protocol,** also known as LU 6.2.
- **AppleTalk,** the latest version of which Apple has modified to run over IEEE 802.2 logical link control-based LANs.

The new release is called TokenTalk for operation over a token ring and EtherTalk when running over Ethernet, but there is no functional difference between the two. (The Ethernet and token-ring versions are collectively referred to here and in the table as AppleTalk.)

TCP/IP on a roll

The TCP/IP combination, usually but not always deployed together, has clearly become the most popular protocol used in multivendor network environments today.

Some TCP/IP implementations for DOS personal computers need only about 30K to 50K bytes of memory. APPC requires around 10 times that amount.

TCP/IP can run over large networks of interconnected LANs and WANs, and offers higher layer functions and a well-defined interface for access to the transport layer. In addition to its nearly universal use in Unix systems and applications, standardized interfaces to TCP/IP allow both NETBIOS and OSI application traffic to run unmodified over — and encapsulated within — a TCP/IP network.

TCP/IP's appeal has grown so great that even vendors whose products traditionally have competed with TCP/IP are now supporting it. These recent converts include Novell and IBM.

In its February release of NetWare enhancements, Novell incorporated concurrent multiprotocol support. The company also made TCP/IP an integral component of NetWare Version 3.11. With TCP/IP support implemented as a NetWare Loadable Module, which the server swaps in and out of its memory as needed,

(continued on page 54)

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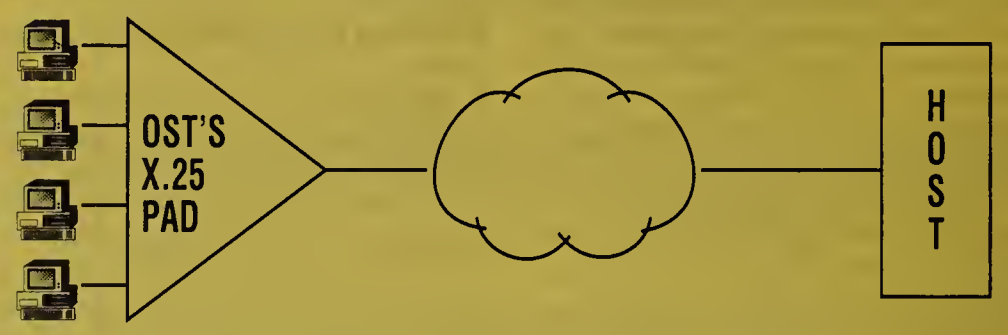

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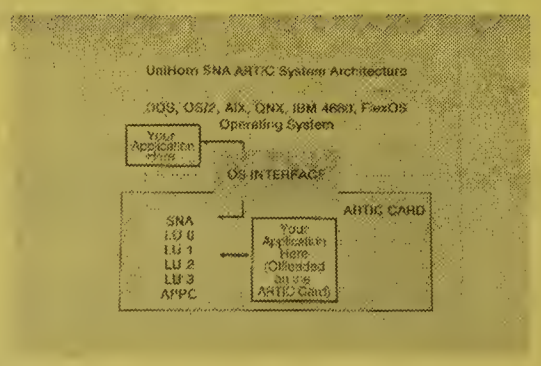

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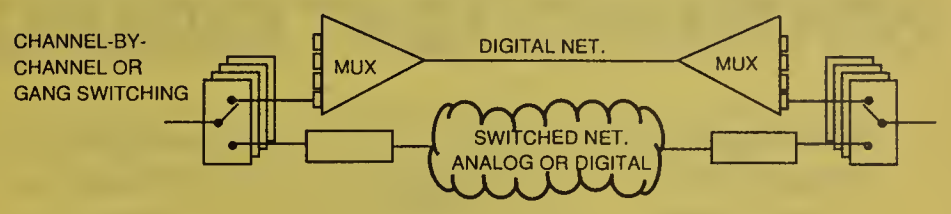

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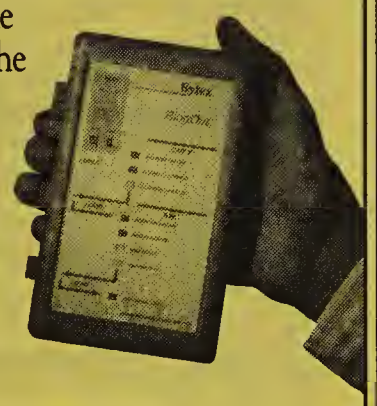

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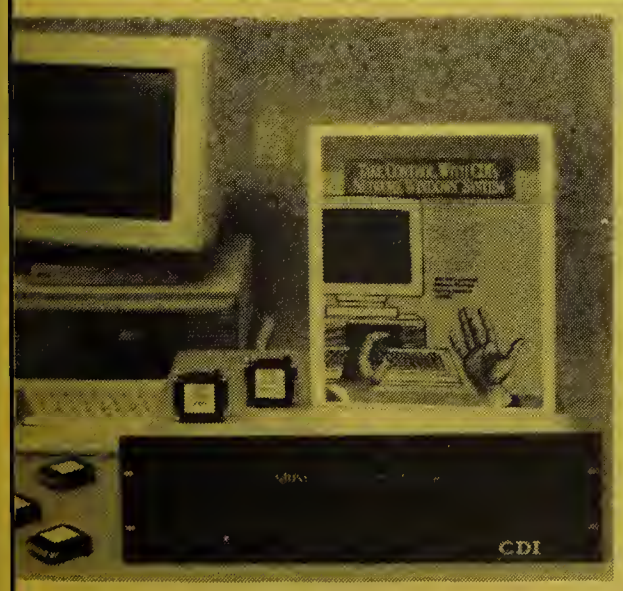

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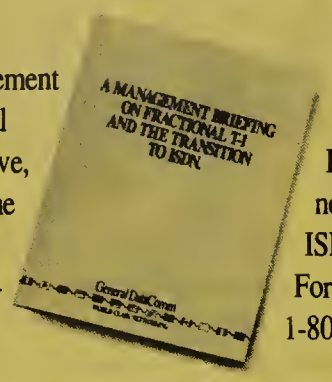

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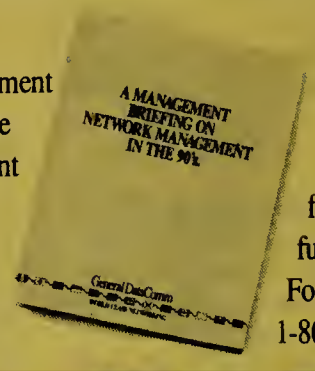

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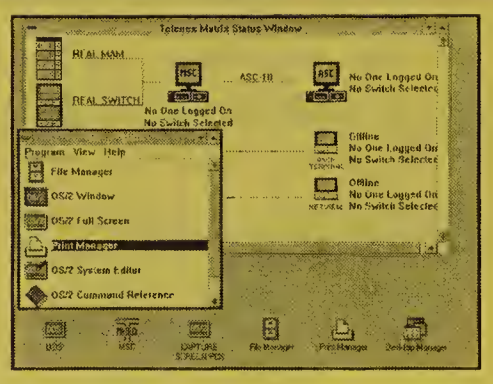

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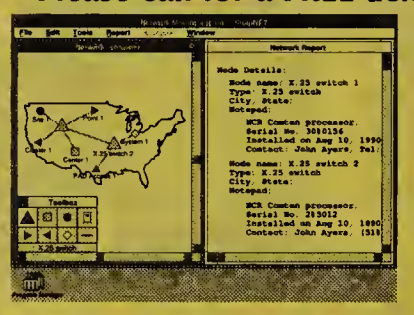

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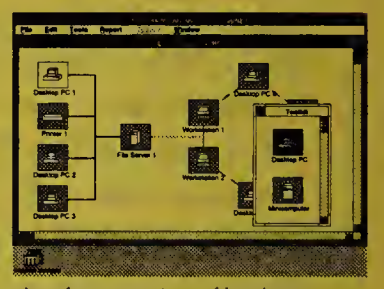

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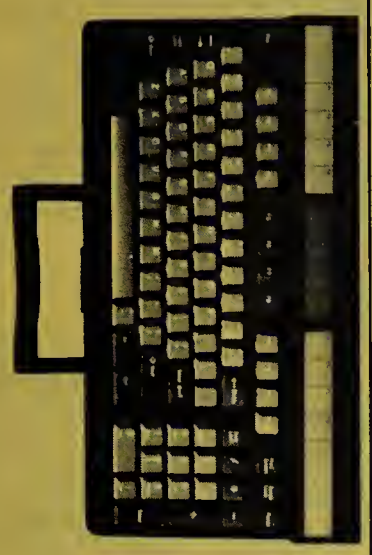

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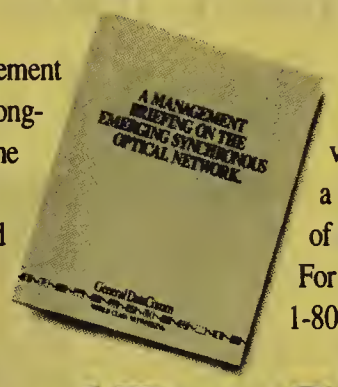

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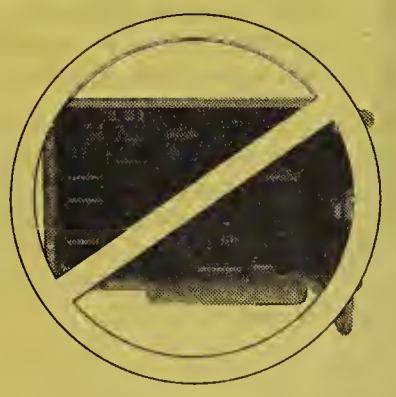

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As the number of local area networks increases, the frequent use of bridges, gateways and routers connecting the products of different vendors, makes them increasingly more complex. The resulting mix of protocols, various network environments, and complex cabling often creates nightmares for the network manager.

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April 8

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LAN operating systems

April 15

Standards update

April 22

Buyer's Guide:
Interexchange carrier digital private-line services
Special: Lead Service

April 29

Twisted-pair networks

May 6

Buyer's Guide:
X.25 packet switches
Show Distribution: Dexpo South,
Special: Harvey

May 13

Trends Reshaping Networks: Security
Show Distribution: GlobalNet,
Special: Lead Service

May 20

Virtual networks update

May 27

SNA Update

June 3

1. Buyer's Guide: Bridges/routers
2. Survey: Critical issues facing users
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Special: Lead Service

June 10

Buyer's Guide:
Bypass equipment

June 17

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June 24

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C. Please Answer ALL Questions, Sign & Date the Form.

1 Industry: (check one only)

01. ☐ Manufacturers (other than computer/communications)
02. ☐ Finance/Banking
03. ☐ Insurance
04. ☐ Real Estate
05. ☐ Healthcare Services
06. ☐ Legal
07. ☐ Hospitality
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10. ☐ Utilities
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12. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
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14. ☐ Government Federal
15. ☐ Military
16. ☐ Aerospace
17. ☐ Consultants (independent)
18. ☐ Carriers
19. ☐ Interconnects
20. ☐ Manufacturers (Computer/Communications)
21. ☐ VAR/VAD/Systems House
22. ☐ Distributor, Computer Related
23. ☐ Distributor, Communications Related
24. ☐ Other _____

2 Job function: (check one only)

1. ☐ Networking Management (Responsible for both voice & data)
2. ☐ MIS Management (VP, Dir., Department Head)
3. ☐ Corporate Management (Chairman, President, Owner, General Manager, CEO, CIO, VP)
4. ☐ Data Communications Management (Responsible for data only)
5. ☐ Telecommunications Management (Responsible for voice only)
6. ☐ Financial Management
7. ☐ Engineering Management
8. ☐ Consultant (Independent)
9. ☐ Other _____

3 What is the scope of your involvement in purchase decisions for Network/Communications products + services? (check one only)

1. ☐ Enterprise Wide (Organization/Subsidiary/Division)
2. ☐ Multi Enterprise (Consultants)
3. ☐ Department Wide

4 What is the total number of sites for which you have purchase influence?

1. ☐ 100+
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1

5 Your primary responsibility: (check one only)

1. ☐ Both Data + Voice
2. ☐ Data Networking Only
3. ☐ Voice Networking Only
4. ☐ None

6 Which transmission media do you use in your network: (check all that apply)

Public:
01. ☐ Switched-Based (DDD, Wats, Megacom, etc.)
02. ☐ Leased Line (not including T-1)
03. ☐ T-1
04. ☐ Fractional T-1
05. ☐ T-3/SONET
06. ☐ Broadband
07. ☐ ISDN

Private:
08. ☐ Satellite
09. ☐ Microwave
10. ☐ Fiber Optic

7 Is your network: (check all that apply)

LOCAL AREA NETWORK
1. ☐ Local (within building)
2. ☐ Local (in a campus environment)

WIDE AREA NETWORKS
3. ☐ International
4. ☐ National
5. ☐ Regional (several states)
6. ☐ Metropolitan

8 What is your network architecture? (check all that apply)

1. ☐ SNA
2. ☐ DECNET
3. ☐ OSI
4. ☐ GOSIP
5. ☐ MAP/TOP
6. ☐ TCP/IP
7. ☐ DCA (UNISYS)
8. ☐ OTHER _____

9 What is your LAN Operating System? (check all that apply)

01. ☐ 3COM (3+, 3+open)
02. ☐ LOCAL TALK (APPLETALK)
03. ☐ BANYAN (VINES)
04. ☐ DCA (IRMALAN)
05. ☐ IBM (LAN Server)
06. ☐ IBM (PC LAN PROGRAM)
07. ☐ MICROSOFT (LAN MANAGER)
08. ☐ UNGERMAN BASS (NET/1)
09. ☐ NOVELL (NETWARE)
10. ☐ TOPS
11. ☐ PROTEON (PRONET)
12. ☐ OTHER _____

10 What is your LAN environment? (check all that apply)

1. ☐ 4M TOKEN RING
2. ☐ 16M TOKEN RING
3. ☐ ARCNET
4. ☐ ETHERNET
5. ☐ STARLAN
6. ☐ FDDI
7. ☐ LOCALTALK
8. ☐ 10BASET
9. ☐ OTHER _____

11 Which operating systems do you utilize? (check all that apply)

1. ☐ IBM DOS (VSE)
2. ☐ UNIX
3. ☐ OS/2
4. ☐ OS/2 Extended Edition
5. ☐ MVS
6. ☐ VM
7. ☐ VMS
8. ☐ XENIX
9. ☐ PICK
0. ☐ OTHER _____

12 Please indicate by vendor the number of mainframes/minicomputers installed in your network.

VENDOR	MAINFRAMES A	MINIS B
01. DEC		
02. IBM		
03. AMDAHL		
04. AT&T		
05. BULL HN IS		
06. NCR		
07. DATA GENERAL		
08. WANG		
09. HEWLETT PACKARD		
10. PRIME		
11. TANDEM		
12. UNISYS		
13. CONTROL DATA		
14. OTHER		

13 Please indicate by vendor the number of microcomputers/workstations:

A. Presently installed in your network.
B. The approximate quantity you plan to install in the next 12 months.

MICROCOMPUTER/ WORKSTATION/ VENDOR	PRESENTLY INSTALLED A	PLAN TO INSTALL NEXT 12 MONTHS B
01. PCs based on 80286 chip		
02. PCs based on 80386 chip		
03. PCs based on 80486 chip		
04. 8086/8088		
05. Macintosh		
06. RISC-based workstations		
07. UNIX-based workstations		

14 What is your planned PC standard? (check all that apply)

1. ☐ EISA
2. ☐ MCA
3. ☐ NUBUS (MACINTOSH)

15 For which areas outside of the U.S. do you have purchasing influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East

16 Check ALL that apply in columns A and B

A) I am presently involved in the purchase process for the following products/services:
B) I plan to purchase the following products/services in the next 12 months:

Presently Involved A	Plan to Purchase B	
		SOFTWARE:
17. ☐	☐	Network Management
18. ☐	☐	Micro to Mainframe
19. ☐	☐	Network Security
20. ☐	☐	Call Accounting
21. ☐	☐	Distributed DBMS
22. ☐	☐	Communications Software
23. ☐	☐	Applications Software
24. ☐	☐	Network Operating Systems Software
25. ☐	☐	EDI Software
26. ☐	☐	E-Mail Software
A	B	DATA COMMUNICATIONS:
27. ☐	☐	Modems (over 9.6kbps)
28. ☐	☐	Modems (under 9.6kbps)
29. ☐	☐	T-1 Multiplexers
30. ☐	☐	T-3 Multiplexers
31. ☐	☐	Fractional T-1 Multiplexers
32. ☐	☐	Data Switches
33. ☐	☐	Matrix Switches
34. ☐	☐	Packet Switches
35. ☐	☐	Protocol Converters
36. ☐	☐	Network Management Systems
37. ☐	☐	Terminal Emulation Boards
38. ☐	☐	Facsimile Machines
39. ☐	☐	Diagnostic Test Equipment
40. ☐	☐	DSU/CSU
41. ☐	☐	Data Security
42. ☐	☐	Data Compression Equipment
43. ☐	☐	Network Adapter Boards
44. ☐	☐	Microwave
45. ☐	☐	Messaging Software
A	B	TELECOMMUNICATIONS:
46. ☐	☐	PBXs (over 1000 lines)
47. ☐	☐	PBXs (200 - 1000 lines)
48. ☐	☐	PBXs (under 200 lines)
49. ☐	☐	Key Systems
50. ☐	☐	Automatic Call Distributors
51. ☐	☐	Voice Messaging Systems
52. ☐	☐	Video Teleconferencing Systems
A	B	SERVICES:
53. ☐	☐	Switched Voice
54. ☐	☐	Dedicated Leased Line
55. ☐	☐	T-1
56. ☐	☐	T-3
57. ☐	☐	Digital Data
58. ☐	☐	Packet Switched
59. ☐	☐	Centrex
60. ☐	☐	Central Office Lan
61. ☐	☐	Satellite
62. ☐	☐	On-Line Information
63. ☐	☐	ISDN
64. ☐	☐	EMail
65. ☐	☐	VSAT

17 Estimated value of networking equipment and services:

A: Which you helped specify, recommend or approve in the last 12 months?
B: Which you plan to help specify, recommend or approve in the next 12 months?

A	B	
1 ☐	☐	$100 million and over
2 ☐	☐	$50 - $99.9 mill
3 ☐	☐	$25 - $49.9 mill
4 ☐	☐	$20 - $24.9 mill.
5 ☐	☐	$10 - $19.9 mill.
6 ☐	☐	$5 - $9.9 mill.
7 ☐	☐	$1 - $4.9 mill.
8 ☐	☐	$500,000 - $999,999
9 ☐	☐	Under $500,000

18 Estimated gross annual revenue of your entire company/institution: (check one only)

1. ☐ over $10 billion
2. ☐ $1 to $9.9 bill.
3. ☐ $500 to $1 bill.
4. ☐ $100 to $499.9 mill.
5. ☐ $50 to $99.9 mill.
6. ☐ $10 to $49.9 mill.
7. ☐ $5 to 9.9 mill.
8. ☐ under $5 mill.

19 Estimated number of employees for your entire corporation:

1. ☐ over 10,000
2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999
4. ☐ 1,000 - 2,499
5. ☐ 500 - 999
6. ☐ under 500

20 Which of the following ISDN products do you plan to purchase in the next 12 months? (check all that apply)

1. ☐ Basic Rate Interface Terminal Adapters
2. ☐ Primary Rate Interface Equipment
3. ☐ Voice/Data terminals
4. ☐ Voice-only terminals
5. ☐ Data-only terminals

21 From which of the following vendors will you consider buying your PBX/Central Office Switch? (check all that apply)

A PBX	B COS	
A ☐	☐	AT&T
B ☐	☐	ALCATEL
C ☐	☐	ERICSSON
D ☐	☐	FUJITSU
E ☐		HARRIS
F ☐		HITACHI
G ☐		ROLM
H ☐		INTECOM
I ☐		MEMOREX TELEX
J ☐		MITEL
K ☐	☐	NEC
L ☐	☐	NORTHERN TELECOM
M ☐		SAMSUNG
N ☐	☐	SIEMENS
O ☐		STROMBERG-CARLSON
P ☐		TOSHIBA
Q ☐	☐	OTHER _____

(continued on next column)

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Directly manages an annual budget of $1.7 million and participates in long and short range planning for ACS with a total annual budget of $7.5 million. In addition, several innovative network management development projects are in progress, including a distributed Ethernet monitoring and management system that will be extended to FDDI networks.

The campus network consists of a large Proteon 80 Mbps fiber-optic token ring backbone with nine hubs, supplying connection to 85 buildings using fiber-optic 10 Mbps Ethernets. Several new buildings are being added to this network every month with the potential for as many as 200 buildings when it has matured. Plans call for the use of FDDI and other high-speed network technology as soon as possible. TCP/IP is the standard protocol, with plans for integration of OSI transport and applications protocols when that becomes possible.

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For more information or the list of headings, call Eleni Brisbois, Resource Directory/Project Manager at 1-800-622-1108 or 508-875-6400.

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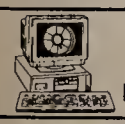
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(continued from page 43)
DOS clients now have three ways to access the NetWare server.

In a pure TCP/IP environment, personal computers would run any of several commercially available TCP/IP implementations for DOS or OS/2 (those of FTP Software, Inc. are detailed in the table; others are available from vendors such as Locus Computing Corp.). These implementations would access the NetWare server as a TCP/IP host.

With Novell's LAN WorkPlace for DOS 4.0, due out this month, DOS and Windows clients will be able to access the server as they currently do via Novell's IPX protocol — except that IPX is encapsulated within TCP/IP for transport over the network. In the third scenario, clients can still access the server using only IPX, as before.

Big Blue and TCP/IP

When asked in late February for information and direction on its current multiprotocol software products, IBM declined to respond. Therefore, the multiprotocol software products listed under IBM in the chart are summarized from product files on IBM's latest offerings.

TCP/IP is standard on IBM's Unix-based RISC System/6000, as might be expected. IBM has also delivered a particularly full-featured TCP/IP support package that runs under OS/2.

NETBEUI's days as a universal LAN transport protocol seem numbered due to competition from standards-based LANs.

▲▲▲

However, TCP/IP on OS/2 can't replace IBM's use of the NETBEUI protocol on IBM LANs. In fact, IBM's TCP/IP on OS/2 raises more questions than it answers.

Without an interface allowing NETBIOS applications to access TCP/IP, IBM appears to have omitted a significant link for its OS/2-based TCP/IP. Auburn, Wash.-based Syntax was quick to fill the void, however.

The vendor's $120 NETBIOS/2 software provides OS/2 systems with linkage from NETBIOS applications to IBM's TCP/IP for OS/2.

It appears there are several battling protocol camps within IBM's product management, which variously endorse TCP/IP, OSI, APPC and now even Novell's IPX. Some consultants have interpreted IBM's mid-February announcement that it would begin reselling NetWare as the beginning of the end for IBM's own competitive product to NetWare, OS/2 LAN Server.

According to a released Novell document, IBM has promised to enhance the IBM 8209 LAN Bridge with support for IPX.

Novell, in turn, has announced its plans for NetWare for Systems Application Architecture (SAA). It reportedly will provide NetWare server-to-IBM-host connectivity via APPC over a token ring. Version 1.0 of NetWare for SAA will run on NetWare 3.11, according to Novell documents. No price has been given.

Novell is also expected to deliver the capability for DOS clients to access both NetWare and IBM OS/2 LAN servers. Initially, this will be done by the DOS station concurrently running both the NetWare client shell (and communicating via IPX on a token ring) and the IBM DOS LAN Requestor (using the NETBEUI protocol to an IBM server).

For OS/2 clients, Novell makes it clear that NETBIOS is the only LAN transport protocol that both IBM and Novell support. NetWare server support of OS/2 clients via APPC, then, appears to be specifically excluded under the terms of the current IBM-Novell agreement.

NETBEUI is an expanded version of the original IBM-promulgated NETBIOS protocol stack that adds the capability to run over an IEEE 802.2 LAN. There are probably more network applications written to the NETBIOS software interface — and, therefore, designed to run over NETBEUI — than for any other protocol stack.

Even so, NETBEUI's days as a universal LAN transport protocol seem numbered due to competition from standards-based LANs. Because of its extensive base of existing applications, however, use of the NETBIOS software interface will likely persist through the rest of the decade, but these applications will probably not be running over a NETBEUI transport protocol by that time.

A growing number of vendors, including Novell, AT&T, Syntax and MicroComputer Systems, Inc., are enabling NETBIOS applications to communicate over transport protocols other than NETBEUI.

Novell's solution is NETBIOS over IPX; AT&T's is NETBIOS over OSI; and Syntax and MicroComputer Systems enable NETBIOS applications to run over TCP/IP.

While IBM hopes that APPC will succeed NETBEUI as the transport protocol of choice for the future, this seems highly unlikely. APPC has two big drawbacks: It has an enormous memory requirement (400K to 500K bytes per workstation), and few software developers have embraced it.

With the exception of Apple, which offers an APPC module for software developers, the only other active APPC proponent is IBM. Instead of pushing APPC, some consultants think that IBM should pursue such other alternatives as developing an enhanced NETBEUI. Ideally, it would require no more than about 150K bytes of memory and would have more lower layer SNA functionality for LAN-to-WAN protocol functionality.

By doing this, IBM would retain SNA as a worldwide transport protocol and affiliate it with the extensive population of NETBIOS application users. In addition, IBM could swap out APPC for software that is compliant with the OSI-Transaction Processing protocol as a long-term strategy.

As mentioned previously, Apple has offered the full specifications of AppleTalk to third-party developers, and at least some are biting. Novell's NetWare for Macintosh, announced in February, comes in two flavors.

The first, similar to the NetWare for Macintosh that Novell offered with earlier NetWares, loads the full AppleTalk stack on the server. Macintoshes then access the NetWare server in the same way they access an AppleShare server.

The second AppleTalk-on-NetWare product, called AppleTalk Support Package 3.0, loads only the AppleTalk transport protocols on the NetWare server. According to Novell, this setup effectively makes the NetWare server an AppleTalk router. In addition, the company hints that new applications, which will use this transport-layer access to AppleTalk more extensively, will be coming soon.

The DEC-Apple joint development affiliation, which has been ongoing for more than two years, has not yet yielded any networking breakthroughs. Given the new protocol-software products that emerged, it appears that Apple still wants Macintoshes to communicate via AppleTalk, while DEC wants them to use DECnet.

The two firms have worked out a way for AppleTalk traffic to be carried encapsulated within a DECnet WAN — a process Apple and DEC refer to as AppleTalk "tunneling" through DECnet. But to do that, a VAX must reside at both ends of any DECnet link through which AppleTalk tunnels — hardly an elegant or cost-effective implementation.

None of the products in the chart reflects yet another way of achieving mixed-protocol intergration: via gateways. Gateways allow different protocols to be run in different parts of the network, rather than running concurrently throughout the net.

However, gateways are inherently bottlenecks. Therefore, their impact on throughput and response-time performance must be carefully evaluated in any network design. Another problem involves network management: It is generally easier to manage a complete network when one or two transport protocols are present everywhere than if radically different protocols are used on a segment-by-segment basis.

While many organizations are embroiled in defining their short- and long-term protocol strategies, some have already learned that any workable plan must support changes at subsequent dates.

No protocol strategy will be able to effectively accommodate every contingency — for instance, simultaneously supporting a dozen different protocols while adding new ones regularly. But a flexible design that can be modified easily will undoubtedly be the key to managing multiprotocol networks.

Letters

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your long-distance call to connect," I'll bet the response would be "About three or four rings, depending on whether someone's home." I do not believe that connect time carries the same message as setup time; in fact, it is purposely vague.

In its column, AT&T could not resist warping its facts into a marketing message. By throwing in some AT&T-created sales revenue projections, the carrier managed to come up with a worst-case scenario, purporting that non-AT&T customers will pay 27% more for 800 service.

In doing so, AT&T moved away from being a purveyor of fact to one of marketing suppositions.

AT&T is a leader in the industry. In many areas, its technology is the standard by which all others are compared. Because of those factors alone, many of AT&T's products sell themselves. Why, then, does AT&T have to stoop to the level of these ads? Why can't it talk about something without spoiling the underlying facts?

Daniel Briere
President
TeleChoice, Inc.
Montclair, N.J.

An overlooked adapter

The Telecommunications section of your Feb. 11 issue featured a box indicating vendors with AT&T-certified Integrated Services Digital Network Primary Rate Interface (PRI) equipment. Unfortunately, Rolm Corp. was omitted under the private branch exchange column.

Rolm's 9757 ISDN adapter, designed to connect customers to AT&T, MCI Communications Corp. and US Sprint Communications Co. ISDN PRI services, was certified by AT&T in 1989.

Bernhard Fliedner
Director of product management for ISDN and networks
Rolm Corp.
Santa Clara, Calif.

Multiprotocol environments — software support (continued from page 42)

Vendor	LAN protocol environment	Primary connectivity scenarios	Software required Scenario(s)	Package	Runs on	Price	For protocol Support
Novell, Inc. Provo, Utah (801) 429-5900	IPX over Ethernet, token ring, Arcnet	1 - DOS and OS/2 clients to NetWare 286 server	1, 2	NetWare 286 (2.15) (includes DOS and OS/2 client software)	NetWare server	$1,895 to $3,295 per server	IPX
	Apple talk over Ethernet, token ring, LocalTalk	2 - Mac clients to NetWare 286 server, file exchange with DOS and OS/2 clients	2	NetWare for Macintosh 2.2	NetWare server	Included with NetWare 286	AppleTalk
	IPX over Ethernet, token ring, Arcnet	3 - DOS (including Windows) and OS/2 clients to a NetWare 386 server	3, 4, 5, 6, 7, 8	NetWare 386 (3.11) (includes DOS, Windows and OS/2 client software)	NetWare server	$3,495 (20 clients) to $12,495 (250 clients) per server	IPX, TCP/IP
	TCP/IP over Ethernet, token ring, Arcnet	4 - DOS (including Windows) clients to a NetWare 386 server, and to TCP/IP hosts	4	LAN WorkPlace for DOS 4.0	DOS/Windows client	$450 per client ($1,995 for 10-client license)	TCP/IP, IPX encapsulated within TCP/IP
		5 - Any TCP/IP clients or servers to a NetWare 386 server (for traditional TCP/IP host services, such as FTP and Telenet)	6	NetWare NFS	NetWare server	$4,995 per server	NFS over TCP/IP
		6 - TCP/IP clients to NetWare 386 server for NFS file services	7	NetWare FTAM	NetWare server	$4,995 per server	OSI (TP4 over CLNS)
	OSI over Ethernet, token ring	7 - Any OSI system to a NetWare 386 server for FTAM file services	8	NetWare for Macintosh 3.0	NetWare server	$895 (20 clients) to $1,995 (100 clients) per server	AppleTalk
	AppleTalk over Ethernet, token ring, LocalTalk	8 - Macs to a NetWare 386 server for AppleTalk file and print services, and file exchange with DOS and OS/2 clients					
OST, Inc. Chantilly, Va. (703) 817-0400	NETBEUI over Ethernets, remote WAN-connected LANs	1 -NETBIOS-based clients and servers, interconnected across remote LANs	1	LAN Xpand-Inter 1.0	LAN/WAN gateway node	$1,750 per gateway	NETBEUI
Sitka Corp. Alameda, Calif. (415) 769-9669	AppleTalk over Ethernet, token ring, LocalTalk	1 - File exchange and E-mail between DOS and Mac nodes	1, 2	MacTOPS	Mac node	$299 per node	AppleTalk
		2 - DOS and Mac clients to a Sun Microsystems, Inc. file server	1, 2	DosTOPS	DOS node	$249 per node	AppleTalk
			2	SunTOPS	Sun server	$1,295 per server	AppleTalk
Synergy Software, Inc. Reading, Pa. (215) 779-0522	TCP/IP over Ethernet, LocalTalk	1 - Macs to TCP/IP hosts (FTP, Telnet, etc.) ability to dynamically select between AppleTalk, TCP/IP and LAT environments	1	VersaTerm 4.5 (runs with and requires Apple's MacTCP and Communications ToolBox)	Mac node	$149 per node	TCP/IP, LAT, AppleTalk (concurrent)
Syntax, Inc. Auburn, Wash. (206) 833-2525	TCP/IP over Ethernet, token ring	1 - DOS (including Windows) and OS/2 nodes running NETBIOS/SMB client/server applications over a TCP/IP network	1	NETBIOS/2 1.0 (provides NETBIOS interface on OS/2 to IBM's TCP/IP for OS/2, which is required)	DOS node	$120 per node ($703 per node for 10 licenses)	TCP/IP
	OSI over Ethernet, token ring	2 - DOS (including Windows) and OS/2 nodes running NETBIOS/SMB client/server applications over an OSI network	1, 2	SMBclient 1.2 and NETBIOS 3.0 (for DOS interface to TCP/IP)	DOS node	$175 per node ($140 per node for 10 licenses)	NETBIOS over TCP/IP
			1	TCP/IP 3.0 for DOS	DOS node	$395 per node ($250 per node for 10 licenses)	TCP/IP
			2	TotalOSI 1.0 (versions for DOS and OS/2)	DOS and OS/2 nodes	$450 per node ($200 per node for 20 licenses)	TOP NETBIOS (NETBIOS over OSI transport)

CLNS = Connectionless Network Service
FTAM = File Transfer, Access and Management
FTP = File Transfer Protocol
IPX = Internetwork Packet Exchange
LAT = Local Area Transport
NETBEUI = NETBIOS End User Interface
NFS = Network File System
SMB = Server Message Block
SMTP = Simple Mail Transfer Protocol
TP4 = Transport Protocol Class 4

This chart includes a representative sampling of multiprotocol LAN software. Other vendors may offer competitive products.

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User solves LAN bridge woes

continued from page 1

suite. NWNL headquarters — located three blocks away — consists of three buildings, each of which is outfitted with a token-ring backbone network.

Departmental LANs supported by the backbones run Advanced NetWare, and attached workstations send data using IPX/SPX.

Because NWNL must transmit information among the three backbones, the company implemented source routing on top of the IPX/SPX protocols to make transmission more efficient.

Source routing sends information over the most efficient path by sending out discovery packets over every possible transmission route. The first packet to return to the sending node has found the quickest path, and the data is sent using this path.

The implementation of source routing at NWNL, however, made it impossible to link WSC's networks to those of its parent company, said Terry Holmes, director of information services at WSC.

According to Todd Pierce, network analyst at WSC, packets exchanged between NWNL and WSC were being discarded because the IPX/SPX-based network could not understand the source routing information in the address header.

Because WSC needed to access an accounting application on the headquarter's mainframe, it had two choices: implement source routing locally or install a box to perform the translation, Holmes said.

WSC did not want to implement source routing because it would require more than two days to modify the 200 workstations and the necessary files in eight servers accordingly. More importantly, Pierce said, WSC feared that the additional discovery packets that source routing uses would degrade network performance.

WSC next checked out protocol converters from such companies as Cicso Systems, Inc., CrossComm Corp. and Wellfleet Communications, Inc. It discovered, however, that the devices these companies offered could not convert source routing to IPX/SPX, but the vendors were willing to develop custom solutions.

"Wellfleet said they could do the translation but we needed a $14,000 box, and the total cost [with the customization we needed] would have been between $36,000 and $43,000," Holmes said. Cisco offered a customized solution with a similar price tag.

WSC finally contacted Novell to determine whether the translation could be done using software. Novell sent along a solution it thought might do the trick.

What Novell sent were then-unreleased drivers that have since been bundled into NetWare Version 3.11. The drivers were the IBM Token-Ring W/AT II Version 2.50 drivers Novell created specifically for use with IBM Token-Ring cards. The idea was to create a protocol translation bridge by loading the new drivers on a separate workstation with the bridge software that comes with Advanced NetWare. WSC then added two Token-Ring cards, one configured for IPX/SPX with source routing and one with pure IPX/SPX.

The translation, Pierce said, would be done by a routing Value Added Process (VAP) — or utility program — that comes as an option with the new drivers.

When the bridge is booted, the VAP is automatically loaded. In use, the VAP dismantles the routed packets and strips out the source-routing information — or adds it, if data is being sent to a source routing net — then reassembles the packets, presenting the data in IPX/SPX format.

The translation went off without a hitch, and the total cost came to $1,200 — the cost of the two Token-Ring cards.

"Bottom line, it was an inexpensive software solution," Holmes said.

Holmes also stressed the new possibilities available to WSC through this implementation.

Currently, he said, paper reports are passed between WSC and NWNL, necessitating dual data entry simply because this protocol translation had not been possible or affordable. Soon, he said, data will be entered once and simply transmitted across the translating bridge.

Pierce concurred. "This opens up so many doors," he said. "Think of electronic mail and all the different kinds of applications we'll be able to use."

Firm touts front end for SQL Server

continued from page 35

In addition to adhering to all international accounting standards, SunSystems is available in English, French, Spanish, Chinese, Japanese and German versions.

Other versions of SunSystems are available for a variety of minicomputers, workstations, Unix systems and LANs.

All existing SunSystems users may upgrade to client/server versions as part of the standard user support agreement.

Beta testing is just beginning, with shipments anticipated later this year. McKie pointed out that delivery dates of new versions can be kept roughly within two quarters because only a small component of the code needs to be changed in order to support the different platforms.

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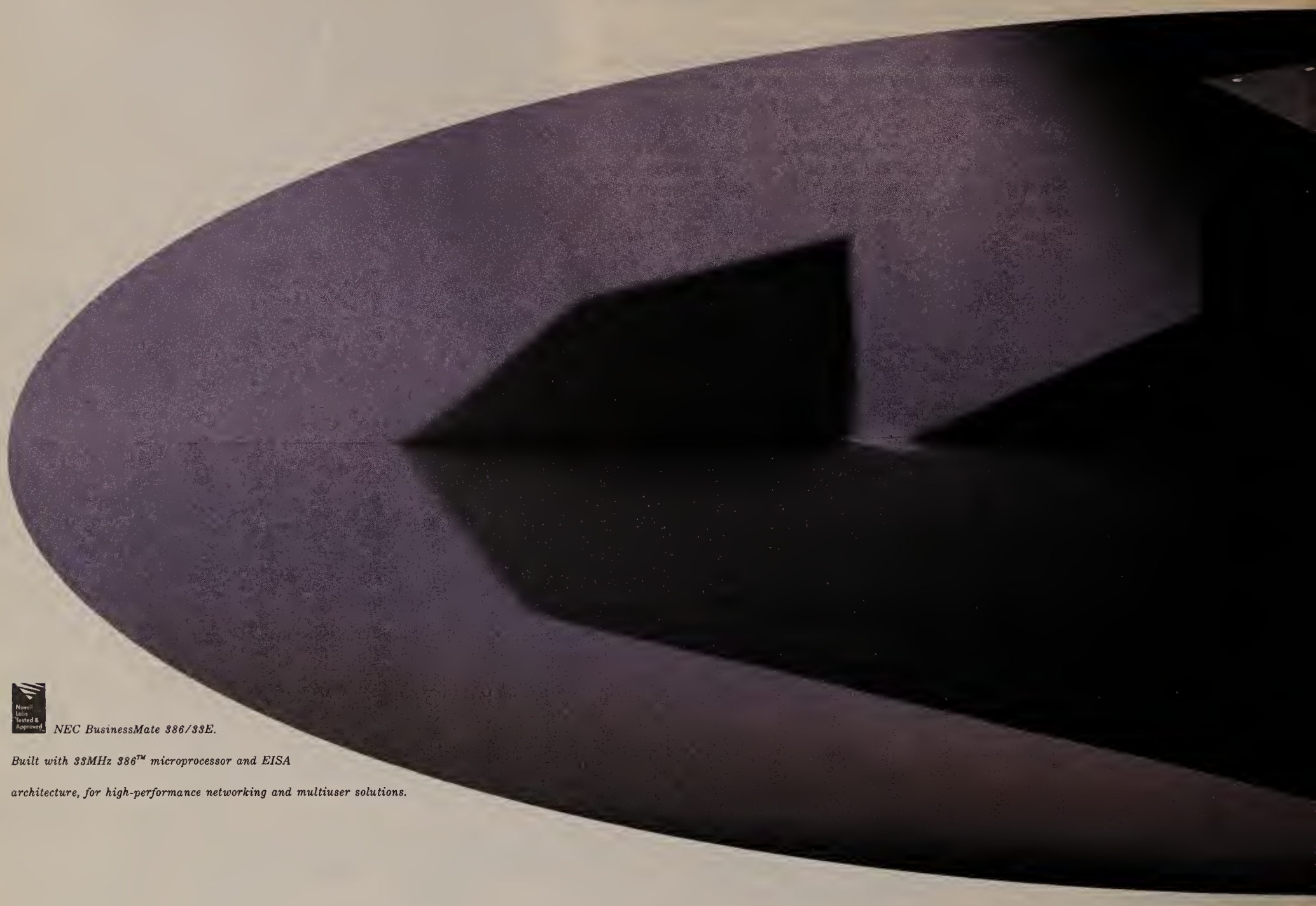

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continued from page 2

sonal computers, and The Wollongong Group, Inc. offers software for Apple Computer, Inc. Macintosh II and Unix-based computers.

3Com Corp. also offers VT support from its CS/2000 series of communications servers. 3Com also plans to release an MS-DOS-based personal computer version of its VT software in May.

The ES-IS routing standard specified in GOSIP 2.0 is a common protocol implemented by many routers today, Mier noted. At least five manufacturers, including Cisco Systems, Inc. and Proteon, Inc., offer ES-IS among the routing protocols they support.

The ES-IS protocol permits end systems, or computers attached to the network, and intermediate systems such as routers to locate one another on the network without requiring the creation of static ES-IS routing tables.

The National Institute of Standards and Technology (NIST), the chief architect of the GOSIP program, is asking government acquisition authorities to specify use of the Basic Rate and Primary Rate Interface for ISDN services.

In particular, NIST outlined six ways B channel services can be used in a GOSIP end system, such as circuit-switched access to a packet handler integral to an ISDN switch and dedicated circuit access to another GOSIP end or intermediate system.

Because development of ISDN services and equipment is rapidly changing, NIST expects to regularly update its ISDN GOSIP requirements.

ODA requirements

GOSIP 2.0 also requires network managers to stipulate Office Document Architecture (ODA) support in their future FTAM and X.400 requests for proposal ("GOSIP 2 may drive vendors to back ODA," *NW,* March 18).

At present, only Unisys Corp. has built support for ODA into its 1984 X.400 product. However, most major system vendors see little problem in augmenting the usual ASCII format to include ODA.

The greater difficulty, they say, lies in creating native ODA word processing products, an area not covered under GOSIP.

GOSIP 2.0 also calls on government agencies to implement the NIST-formulated network addressing scheme that is intended to uniquely identify each end system in the network in order to route data to that point.

The NIST plan — which many say is the best OSI network addressing scheme promulgated in the U.S. today — is referred to as Network Service Access Points. The General Services Administration is the official authority designated to assigning the network addresses to government agencies.

GOSIP 2.0 also lists several options for network managers to consider in their purchases, including security features, provision of Connectionless Transport Service (CLTS) and Connection-Oriented Network Service (CONS).

NIST wants the ISO Connectionless Transport Protocol to be used for internetworking of concatenated subnetworks and for operation of a single logical subnetwork.

CONS is an optional service that may be specified for end systems that are directly connected to X.25 networks. The GOSIP document states that the "use of CONS can lower the overhead associated with the Connectionless Network Protocol [CLNP] and may permit interoperation of systems that do not comply with GOSIP," that is, do not implement CLNP.

Jerry Mulvenna, manager of the network applications group at NIST, said that CLTS and CONS had been included because the two allow for network efficiency and easy integration of different net technologies.

Although few vendors can today deliver the communications features required under GOSIP 2.0, analysts predict that a full range of products will be available by the end of 1992.

Du Pont to insist vendors support ODA

continued from page 5

change, he said.

"We are real simple people here," Hoffman said. "We want to take documents and send them anywhere and reach out and access them anywhere. We need ODA to exchange documents with anybody without having to use gateways and translators.

"We use these things because we have to," he added. "But sometimes we get so frustrated that we just pick up a floppy disk and [send the document via Federal Express]. We can't afford to keep converting documents from one format to another."

Hoffman said he is particularly pleased with IBM's statement last week that it will support a native implementation of ODA for its revisable document architecture rather than an existing proprietary standard called Mixed Object Document Content Architecture (MO:DCA).

Frank Dawson, a programmer in the datastream, architecture and standards group at IBM, said the company recently decided "that providing open systems was more important than providing MO:DCA."

Washington, D.C. Correspondent Ellen Messmer contributed to this story.

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TI irons out wrinkles in EDI system

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ring EDI documents over X.400 links, will ease some technical problems and speed vendor development of products supporting EDI-over-X.400 transmissions.

Theodore Myer, chairman of Rapport Communication, a Washington, D.C.-based information exchange consultancy, said the X.435 standard's more coherent identification scheme will help fix the addressing problem that currently plagues users such as TI.

Payne said cumbersome addresses presented one of the initial problems TI encountered during the pilot, which involved document exchanges with trading partners such as Digital Equipment Corp. in Europe and The Boeing Co. in the U.S.

"We found that everyone had taken a different approach to addressing; they used everything from personal names to country codes to identify themselves," he said. "In some cases, the address fields [in our EDI documents] weren't even large enough to accommodate some of the more lengthy X.400 addresses."

Another glitch, Payne said, was inconsistent delivery acknowledgments. Users must develop a system that will differentiate those trading partners that send X.400 acknowledgments in real time from those that send traditional EDI functional acknowledgments, which are typically sent in batch form a day or two later.

"The X.400 acknowledgment has been working great, and it would be ideal if all our partners sent acknowledgments, but that's not the case," he said. "So it requires more logic on our end to keep a profile of what to expect from each partner."

Payne said the testing also pointed out problems with links between TI's carrier, MCI Communications Corp., and trading partners supported by other VANs. Because sending documents over an X.400 channel to non-X.400 trading partners requires greater reliance on VANs, VAN-to-VAN interconnect reliability is key, he said.

"Reliability is always a big concern when dealing with multiple VANs. But it's even more critical when transmitting X.400 to non-X.400 because if something goes wrong, it's more difficult to determine who's responsible," he said.

Payne also said many VANs are not interconnected. Links between networks in the U.S. are sufficient, he said, but there are still too many VANs that aren't connected to international post, telegraph and telephone administrations.

But perhaps the greatest obstacle to implementing a full-scale EDI-over-X.400 program, Payne said, is the lack of X.400-ready trading partners. The cost of implementing a program is prohibitive for many companies. TI's pilot cost $100,000 for the hardware and software alone.

"The technological, interconnect and cost hurdles we've had to deal with in this pilot are minor compared to the problem of finding trading partners," Payne said. "Because the technology is new and because it's expensive to have your own X.400 gateway and private domain, many companies are holding off."

Rapport's Myer agreed. He called EDI-over-X.400 a pioneer's game, in which demand will initially come only from the largest EDI users.

"Users will have trouble cost-justifying this bigger and better EDI capability if their current system is working fine," Myer said. "X.400 is the smart long-term strategy, but many users either don't understand that or they're waiting for more products."

Despite the obstacles, Payne said TI is fully committed to its EDI-over-X.400 program to help it achieve a competitive advantage. Last month's ratification of X.435 will aid in pushing the technology, he said. A standard method for sending EDI over X.400 will enable users to send EDI and E-mail over a common network.

Intergraph offers NetWare, DB2 link

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of Daratech, Inc., a Cambridge, Mass., CAD/CAM consulting firm, said the announcement signals recognition by Intergraph that it must connect with popular personal computer-based design nets.

"Basically, Autodesk's been eating Intergraph's lunch, especially in architectural design, where it has almost 70% of the market," Foundyller said. "Users recognize Intergraph is selling a Rolls Royce, and what they want is a Volkswagen on their desk." Still, he said, Intergraph must provide the links to lower end systems.

On the IBM side, Intergraph announced the RIS Data Server for IBM DB2 Relational Database (RISDIL) and RIS Client (RISCCU). RISDIL is data base server software that resides on an Intergraph workstation or server and gives users read and write access to data on remote IBM DB2 data bases located on IBM System/370 or System/390 mainframes. RISCCU is Intergraph's generic SQL interface that runs on an Intergraph server and provides an SQL link between a client workstation and an RIS-based application on the server.

Intergraph NetWare is available now and costs between $2,000 and $6,500, depending on the number of clients accessing the Intergraph server. RISDIL is expected to be available in the second quarter of this year and will range in price from $50,000 to $255,000, depending on mainframe configuration. RISCCU is included as part of the RIS system.

DEC adds mgmt. to EMA

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bring remote systems on- or off-line, load new software, back up files or reboot systems that have failed. DEC's ultimate goal is to provide expert system applications that will automatically handle such tasks.

Analysts and users applauded DEC's announcement, saying vendors need to combine system management and network management capabilities.

Today's network management tools ensure that data can be shared by remote sites. But users have to rely on stand-alone system management tools or staff at remote sites to ensure that the systems receiving that data are functioning properly.

"Now we're going to actually start dealing with system resources attached to the network from a central site," said Leslie Maltz, director of computing and communications resources at Stevens Institute of Technology in Hoboken, N.J., and a member of the Digital Equipment Computer Users Society.

"The concept is wonderful," Maltz added. "It will eventually give us an opportunity to [automate some tasks], off-load them from our operations staff and give them the time to work on more creative things."

According to Howard Niden, senior manager and director of Price Waterhouse's Great Lakes VAX Consulting Practice in Chicago, "There probably would be a lot more people willing to implement large networks of distributed systems if remote management tools were more widely available."

Polycenter is being implemented within the DECmcc Director framework because it is the integrated management tool built to conform with EMA. DECmcc Director collects management data from network devices and, in the future, computing systems. It also includes applications that process incoming data to determine if alarm conditions exist or if performance is degrading. Versions running under VMS are already available, and an Ultrix-based version is due out later this year.

By 1992, DEC will enable DECmcc Director to manage Unix-based systems attached to remote local-area networks. By 1993, DEC will integrate system management applications with network management applications running under DECmcc Director (see graphic, page 1)

This will enable network management applications to initiate system management tasks including allocating more memory to run specific applications.

Later, DEC hopes to roll out expert system applications that detect problems on remote systems, determine the best way to resolve them and automatically take corrective action.

One of the major tasks facing DEC is deciding how to fold various system management functions into DECmcc Director. Product planning teams must decide whether to off-load system management applications from VAXes to the DECmcc Director or to use DECmcc Director facilities to control system management applications on other VAXes.

For example, a version of DEC's existing VAX-based Remote Environmental Monitoring Software running under DECmcc Director could prompt a central-site operator to take action when remote computer room temperature or power consumption changes.

Alternatively, DECmcc Director could use an integral messaging facility to transmit an electronic mail message to another operator or technician who is better qualified to deal with the problem.

Several third-party vendors, including Applied Information Systems, Inc., Computer Associates International, Inc., Raxco Software, Inc. and UIS, Inc., last week announced that they would develop versions of their VAX-based system management products to run under DECmcc Director.

DEC also pledged to build support for system management standards being developed by the Open Software Foundation (OSF) and the International Standards Organization (ISO) into EMA. OSF is building its Distributed Management Environment (DME), which is intended to enable central-site personnel to manage network links between distributed systems and to monitor remote system performance.

OSF's DME will define, among other things, a set of application program interfaces (API) that will enable DEC and other developers to write agent software for disparate systems that responds to commands issued from DECmcc Director. With these APIs, DECmcc Director can check parameters such as disk allocation and usage on remote LAN-attached microcomputers.

"DEC has to wait to see what OSF comes out with in the DME before it can definitely say this is how it is going to implement the Polycenter strategy," said Paul Li, a manager at Network Strategies, a consulting practice of Ernst & Young in Vienna, Va.

ISO has approved a draft of its Structure of Management Information standard, which defines how systems and system resource attributes can be linked into a management data base. This will let, for example, acceptable system parameters be displayed on a screen beside existing parameters when alarms are received.

Introduction of Polycenter positions EMA against IBM's SystemView, an architecture for combining system and network management. However, Li said IBM has not released as much detail of its architecture as DEC has.

"IBM has a lot of work to do in terms of defining where it is going with system management," Li said. "But what DEC has come out with in Polycenter is a more strategic definition."

Novell to be at work on plan

continued from page 1

other net management systems, such as IBM's NetView, and support standard management protocols such as the Simple Network Management Protocol (SNMP) and Common Management Information Protocol.

While Novell isn't speaking publicly about its plans, the leading LAN vendor outlined its strategy behind closed doors at a recent NetWare Developers' Conference here. Novell also unveiled plans for a soon to be announced X.500-based global naming service, although details were unavailable.

Sources who attended the developer's meeting said Novell provided little hard information on the specific products that will flesh out the management architecture or on its timetable for delivering such products.

But they said the company outlined a general implementation plan with at least two phases.

In the first phase, Novell will provide a set of application program interfaces and other tools to help developers build interoperable management products for NetWare 3.11 LANs. In Phase 2, Novell will help developers link those applications into its central management system.

An initial tool kit is scheduled to be available by midsummer and will cost $4,995, said one independent software developer who requested anonymity.

Another version of that tool kit, designed to help developers tie management applications into the central system, is scheduled to be available by mid-1992.

According to attendees, Novell demonstrated a prototype network management product at the developers' conference. The demonstration involved a Novell-developed graphical user interface running on an OS/2 workstation that will be used in conjunction with the central management system.

According to one attendee, an administrator using the interface could point and click on icons of devices throughout an enterprise internetwork and get a close-up view of activity at those devices.

The source said Novell explained that by using the central management console, an administrator will be able to obtain hardware and software management information about each node in the enterprise.

Attendees said Novell was talking strategy, but actual products are far off. "What I saw was only the start — it was only a foundation," one attendee said.

But analysts applauded the scope of Novell's vision. Mitch Shults, an analyst at Business Systems Group, Inc. in Houston, cautioned users against the misconception that Novell is developing simply another management protocol, as had been reported. "To compare what Novell is doing to SNMP is like comparing the Empire State Building to an outhouse," he said.

When the architecture is fully in place, analysts said it will be hard to rival. "[Users] will find management much simpler: they'll be able to integrate logical and physical management," said Frank Dzubeck, president of Communications Network Architects, Inc. in Washington, D.C.

DEC upgrades mgmt. tools, unveils new security pack

MAYNARD, Mass. — Digital Equipment Corp. last week rolled out enhanced versions of existing remote network management products and new system security software.

Chief among the enhanced products is a new version of the VAX-based Remote System Manager (RSM), which enables central-site VAXes running RSM server software to download software to remote VAXes running RSM client software. It can also back up files and check configuration on remote clients.

Version 2.3 includes client software for remote Ultrix and VAX 3100s as well as a diagnostic tool to troubleshoot problems incurred when downloading software to remote systems. Available next month, RSM Version 2.3 server software pricing starts at $4,400, while client software starts at $535.

Also introduced was Version 1.3 of Remote Environmental Monitoring Software (REMS), which runs on a central-site VAX. The software receives alarms from remote computer room environmental monitoring systems and uninterruptible power supplies.

The new version of REMS can instruct DECalert Version 1.1 software to send a predefined message to a system operator's console that is equipped with DEC's DECtalk text-to-speech product. DECtalk will read the message to the operator or dial a predefined number and read it when the phone is answered.

Before, REMS could only send electronic mail messages to operators or issue commands to shut down faulty remote equipment. REMS Version 1.3 costs $4,450.

DEC also announced enhancements to DECalert last week. Version 1.1 will now kick off messages when receiving alarms from Ultrix systems and notify system managers to call in for messages via SkyTel's SkyPager or Motorola, Inc.'s People Finder pagers. DECalert Version 1.1 is priced at $65,000.

In addition, DEC introduced security software called DECinspect, which runs on each VAX in a net and records attempts to read certain files and directories or to change system parameters.

VAXes running the new Security Reporting Facility for VMS can collect data recorded by DECinspect, enabling centralized system managers to analyze compliance with system security measures. Availability and pricing have not been announced.

— Jim Brown

NETWORK WORLD

161 Worcester Road
Framingham, Mass. 01701-9172
(508) 875-6400

Second-class postage paid at Framingham, Mass., and additional mailing offices. *Network World* (USPS 735-730) is published weekly, except for a single combined issue for the last week in December and the first week in January by Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

To apply for a free subscription, complete and sign the qualification card in this issue or write *Network World* at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on information supplied, the publisher reserves the right to reject non-qualified requests. Subscriptions: 1-508-820-7444.

Non-qualified subscribers: $5.00 a copy; U.S. — $95 a year; Canada, Central & South America — $110 a year; Europe — $165 a year, all other countries — $245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin. Please include mailing label from front cover of the publication.

Network World can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zebb Road, Ann Arbor, Mich. 48106.

Network World is distributed free of charge in the U.S. and Canada only to qualified management or professionals who specify and maintain communications equipment and systems, including voice, data and video, as well as to common carriers, consultants, systems houses and manufacturers of communications equipment.

POSTMASTER: Send Change of Address to *Network World*, 161 Worcester Road, Framingham, Mass. 01701-9172.

User redraws its global net map

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investment in new equipment.

Johnson credits voice compression for the savings. By compressing voice calls to between 8K and 5K bit/sec, Continental Grain is able to pack as many as 10 voice channels onto a single 64K bit/sec circuit.

The savings on switched voice traffic will pay for the entire 128K bit/sec U.S.-to-Europe link, which means data traffic will travel over the network at no cost.

"What voice compression allows you to do is piggyback a lot of different services over the same circuit," Johnson said. "If compression wasn't there, we wouldn't be doing this type of thing."

The network makeover

Continental Grain is installing a Republic Telcom Systems Corp. Rnet voice/data switch in its Geneva hub, along with a Republic Telcom RLX-16N multiplexer. RLX-16N or RLX-8N multiplexers will be installed in other sites on the network.

The RLXs will handle voice compression.

The devices will derive as many as 10 voice channels, two 9.6K bit/sec facsimile channels and two 19.2K bit/sec data channels out of the 128K bit/sec circuit.

As many as six voice channels, one 9.6K bit/sec facsimile channel and two 9.6K bit/sec data channels will be derived from each 64K bit/sec circuit.

Each RLX multiplexer will be linked to a local private branch exchange. Voice traffic sent to an RLX will be compressed and routed to the Rnet switch in Geneva.

The Rnet then will switch the traffic to a multiplexer at the appropriate site, which will decompress the call and route it to a local PBX for termination.

The private net will support a seven-digit dialing plan that will work with the seven-digit dialing plan supported on Continental Grain's MCI Communications Corp. Vnet in the U.S.

Calls between the private net and the Vnet will be exchanged over T-1 links between headquarters and a local MCI point of presence.

The data channels will carry electronic mail and files among Banyan Systems, Inc. LANs in Hamburg, Geneva, London and New York. Data will flow from Banyan servers in those cities to local RLXs, which will pass the information to the Rnet hub. The hub will hand data off to an adjacent Banyan server, which will act as a router directing the information to its destination.

Johnson said the $1 million operational cost of the private net will be offset by a reduction in international switched voice expenditures. Net savings will be reaped by reducing Continental Grain's use of public electronic mail services from GE Information Services (GEIS).

Currently, Continental Grain uses GEIS for all E-mail between Banyan LANs at a cost of about $1 per message, Johnson said.

Fierce competition

Competition was fierce among vendors for the contract. William Klauk, Continental Grain's manager of communications operations, said the Republic Telcom multiplexers won out over multiplexers from Newbridge Networks, Inc. and Timeplex, Inc. primarily because 8K bit/sec compressed voice sounded better on the Republic Telcom equipment.

European hubs were considered in Paris, Geneva and London with British Telecommunications PLC. Klauk said the British carrier lost on price.

France Telecom and Switzerland's national carrier were close on price, but the Swiss carrier had an edge because Continental Grain's European headquarters is in Geneva.

World Communications, Inc. is supplying the U.S. half of the transatlantic 128K bit/sec circuit partly because of concessions including free local-loop access and two free months of service. An outsourcing offer from Infonet Services Corp. was turned down because it was far too expensive, Klauk said.

DEC to enter hub market

continued from page 2

with a bridge and five-port modules results in a price of $286 per port. That price is at the middle to high end of the low-end hub market, according to Howard.

"It's not price-competitive with SynOptics [Communications, Inc.] or Cabletron [Systems, Inc.]," he said.

DEC officials said the hub will be sold through distributors in an effort to reach customers outside DEC's installed base.

The hub's modules can be inserted and removed without disrupting the net, DEC officials said. The hub features a serial network management bus linking the modules, and two hubs can be daisy-chained together to share network management.

The port modules available for the hub include the DECrepeater 90T, a 10BaseT Ethernet interface supporting eight unshielded twisted-pair ports, and the DECrepeater 90C, which supports as many as six thin-wire coaxial connections. The repeaters detect cable faults and automatically isolate the associated port.

The bridge available for the hub, the DECbridge 90, filters 29,694 packet/sec, forwards 14,847 packet/sec and automatically learns network addresses, according to DEC officials. The bridge supports a maximum of 200 nodes.

The bridge, built with proprietary Application Specific Integrated Circuits, supports the Spanning Tree Protocol and performs protocol filtering. The module provides port-level management of the port modules in the hub.

> The hub's modules can be inserted and removed without disrupting the network, according to DEC officials.
>
> ▲▲▲

The bridge itself is managed using the DECnet Maintenance Operation Protocol (MOP). Support for DEC's DECmcc network management station and the Simple Network Management Protocol (SNMP) is planned, according to Ralph Dormitzer, DEC's group manager for low-end networks and communications.

"We're building a box for the hub that translates between MOP and SNMP," he said. DEC will publish the SNMP Management Information Base for that module.

SNMP support is critical to compete in the hub market, Infonetics' Howard said.

Howard noted that the DEChub 90 lacks specific hub management software and security features such as port locking or eavesdropping prevention that some other hubs offer.

The terminal server for the hub, the DECserver 90L, supports as many as eight asynchronous devices at data throughput rates of 1,200 to 38.4K bit/sec. The server's software is read-only memory-based and does not have to be downloaded from a host system.

The DECserver 90L monitors each port for cable faults or loss of power at the terminal or printer and notifies the host to terminate the related session.

The DEChub 90 with power supply costs $890. The DECbridge 90 costs $2,890 for a stand-alone configuration and $2,840 for the hub module. The DECrepeater 90 costs $1,590 for the stand-alone configuration and $1,540 for the hub module. The DECserver 90L costs $1,450 for the stand-alone configuration and $1,275 for the module.

Users criticize LECs' reductions

continued from page 4

untarily signed on to the new regulatory plan. All of the carriers made their first tariff filings under price cap regulation last week, but the price changes are subject to FCC approval.

Price cap regulation limits the rates a carrier can charge, as opposed to limiting profits, which was the case under the previous rate-of-return system. The price cap plan implemented for the local carriers is a hybrid. It caps rates and gives carriers increased pricing flexibility, but it also places a ceiling on profits.

Prices were capped at their Jan. 1, 1991, levels, and future price increases are worked out according to a complicated formula that factors in a host of economic variables.

In its price cap filing, US West, Inc. filed the largest percentage decrease. It proposed to drop its rates 2.2%, or $42 million. General Telephone, which proposed reductions of 1.33%, or $26.3 million, and Pacific Telesis Group, which proposed to drop rates 1.26%, or $19.3 million, filed the next largest rate declines. The smallest reduction was proposed by Southwestern Bell Corp., which asked for a decrease of 0.34%, or $5.6 million.

BellSouth Corp. proposed a rate increase of 0.22%, or $5.8 million. A spokesman said the increase is necessary because under price caps, the carrier will lose subsidies that helped defray the cost of serving rural areas.

Although carriers reduced rates by a total of $177 million, the rates for some services increased. The price cap plan calls for the carriers to segregate services into four categories — common line, traffic sensitive (switched access), special access and interexhange services.

Two of the carriers — Southwestern Bell and Pacific Telesis — did not provide rate information for individual service categories. But four carriers — Bell Atlantic Corp., BellSouth, Nynex Corp. and US West — proposed rate increases for special access. General Telephone and United Telephone lowered special access, and Ameritech had no change in its rates.

Vendors to build standard RISC

continued from page 4

proposed workstation standard.

The backing of LAN vendors is important to the success of the consortium because users will need to tie the powerful new machines into LANs as clients and servers.

"Banyan has always looked to standards as a path to follow in the industry," said Bill Johnson, the company's director of business development. "If a RISC architecture, complete with operating system support and standard hardware technology, is supported by a number of major industry players," Banyan needs to support it.

Banyan already has a joint development agreement with Compaq under which the LAN vendor could develop VINES support for the new workstation architecture, Johnson said. He declined to say how Banyan would support the architecture but added that the company must address users' desire to employ RISC computers as high-performance servers and LAN clients.

"We see connectivity into existing corporate environments as an important aspect of RISC technology becoming [accepted widely]," Johnson said. "We're sending a message to our installed base and prospects that we are committed to supporting this [effort]."

Ray Noorda, Novell, Inc.'s chairman, president and chief executive officer, said he expects his company will eventually support the consortium's proposed standard RISC-based workstation architecture.

The RISC workstation architecture is expected to be based on new R4000 processors from MIPS Computer Systems, analysts said.

The operating system software will likely be developed by Microsoft and SCO, a maker of Unix operating system software.

Workstations supporting the standard should be available sometime next year, sources said. By defining a standard RISC workstation architecture and operating system, the consortium hopes to spur development of off-the-shelf workstation applications, a key to sparking user interest.

The coalition is seen as a challenge to Sun Microsystems, whose rival scalable processor architecture has the largest share of the RISC market, and to IBM, whose Intel Corp.-based personal computers dominate the commercial desktop systems market.

Despite the support of many powerful vendors, analysts are skeptical about the consortium's chances for success.

"Consortia tend to go nowhere in a hurry," said Bruce Jenkins, an analyst with Daratech, Inc., a market research firm in Cambridge, Mass. "If history is any guide, when competitors get together to try to force standards and arrive at an industry consensus, it has not always panned out well."

If the consortium is successful, it could trigger a major realignment of the workstation market, said Bill Bluestein, an analyst with Forrester Reseach, Inc., a Cambridge-based market research firm.

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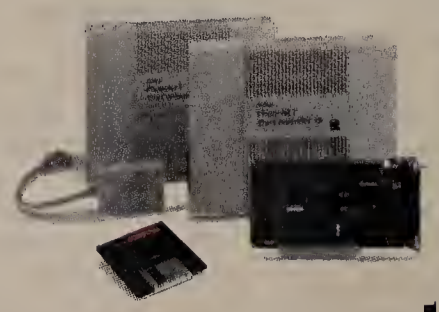

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